PERFORMANCE APPRAISAL FOR DATA PROCESSING PERSONNEL AND THE MEASUREMENT OF USER SATISFACTION FOR USERS OF COMPUTER BUREAUX

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ABSTRACT

This thesis reports the results of a research project which although originally conceived of as a single project, resulted in two fairly distinct studies.

Study 1 involved the development and utilisation of a Behaviourally Anchored Rating Scales (BARS) performance appraisal (PA) format for DP personnel. Following a seven month period during which subjects in two experimental groups were appraised twice with the new BARS format, an increase in satisfaction with feedback from agents was recorded. While subjects in two control groups who were appraised with an existing traits-based rating scales format showed no change in satisfaction with feedback from agents.

Study 2 was concerned with the measurement of user satisfaction for users of commercial computer bureaux. A questionnaire was administered to 811 client users of four bureaux. Follow-up interviews were conducted with 23 users.

Factor analyses of the questionnaire data revealed that three underlying factors accounted for the majority of variance in the satisfaction of the bureau users. The major factor identified was concerned with the quality of the interaction between users and bureau personnel. This finding illustrates the importance of the 'human face' of the service provided.

CHAPTER ONE

INTRODUCTION

"Data Processing People - Are They Really Different?"

C.K. Woodruff used the above question as the title for an article he wrote in 1980. Had he asked this question of an average man or woman in the street a decade ago he would almost certainly have been responded to with emphatically affirmative replies. Today fortunately the aura and mystique of the computer world of old has largely disappeared and data processing (DP) personnel are seen in a similar light to personnel of many other professions. Nevertheless DP personnel do differ although certainly not to the extent that people might have thought ten years ago.

Many researchers, Woodruff amongst them, have found that DP personnel typically have higher needs to achieve (n-ach) but lower needs for affiliation than their average general population counterparts. Frequently associated with high n-ach is a dependency on performance feedback.

In this research the above relationship is investigated by developing a performance appraisal (PA) format, which has proven qualities in the area of performance feedback, and which is suitable for DP personnel. The effectiveness of the new format, a behaviourally anchored rating scales (BARS), is compared with that of traits-based rating scales.

A second and equally important part of this research involved the study of user satisfaction of computer bureau users. There were two objectives behind conducting this study of user satisfaction. Firstly it was to provide an independent measure of the performance of the DP personnel from the first part of the research, following their appraisal with the BARS format. Secondly, user satisfaction has been looked at for in-house computer users and for university computer centre users, but to date, does not appear to have been investigated with users of a commercial bureau.

The objective was to see if user satisfaction could be measured as successfully for a commercial bureau as it had been in the other two situations, and subsequently to compare the findings of the relevant studies. The procedure adopted, involved surveying users by way of a questionnaire, followed by interviews with selected users.

To satisfy the requirements of the first part of the research, the user satisfaction survey was to have been conducted twice to provide a before and after measure of user satisfaction. Unfortunately for reasons which are given in section 3.1 of this report, it was not possible to conduct the second survey. As a consequence, the independent measure of ratee performance was not obtained. Effectively this severed the link between the first part of the research and the second, resulting in two largely independent studies. These are reported in this thesis as Study 1 and Study 2.

The remainder of this thesis is organised in five chapters as follows: Chapter Two contains a two-part literature review. Part 1, which relates to Study 1, reviews literature which has focused on the personal characteristics

of DP personnel. This is then related to research in the area of PA with particular attention given to the BARS method. Part 2 begins with a look at the available means for assessing the effectiveness of information systems, and then concentrates on the research which has looked at one particular criterion - user satisfaction. Chapters Three and Four are concerned with the execution and outcome of Study 1 and Study 2 respectively. Chapter Five is a general discussion of the research as a whole, while Chapter Six states the conclusions which can be drawn from the research.

CHAPTER TWO

REVIEW OF THE LITERATURE

2.1 PART 1

The initial focus of the review in Part 1 is concerned with research in the area of personal traits and characteristics of data processing (DP) personnel. This work identifies the importance of performance feedback for such personnel, and this leads to a review of performance appraisal (PA). From this, the focus narrows to look at research conducted on a particular PA format, namely Behaviourally Anchored Rating Scales (BARS).

2.1.1 Data Processing (DP) Personnel

In an attempt to determine and assess the relevant distinguishing characteristics of DP personnel, Woodruff (1980), administered the Personality Research Form - Form [AA], developed by Jackson (1974) to 202 DP personnel. Using the data obtained from the survey, Woodruff established personality profiles for the 202 DP personnel, based upon H.A. Murray's Variables of Personality (Woodruff, 1980). Comparisons of these profiles with those of their general population counterparts revealed, amongst other factors, that both DP males and females possessed a considerably higher need for achievement (n-ach) than their average general population counterparts.

A study conducted by Perry and Cannon (1968) concerning

the vocational interests of female programmers also found that their subjects possessed higher than average n-ach.

Following a nationwide (U.S.A.) survey of DP personnel, Couger and Zawacki (1980), concluded:

> *"Our survey revealed two characteristics of computer personnel that require special management action - their low social need and their high growth need." (p.5)*

2.1.2 The Importance of Performance Feedback

It has long been recognised that feedback about an individual's behaviour is essential for learning, motivation and performance. Considerable research has been conducted on the subject (see reviews of feedback by Adams, 1968; Locke, Cartledge and Koeppel, 1968; Sassenrath, 1975). In addition to this general study of feedback, a number of studies have focused on the roles of various personality traits in goal setting and with feedback effectiveness. Of particular interest to this study is the research which has been concerned with the influence of the personality trait n-ach on feedback.

Using female supervisors as subjects, Steers (1975), looked at the influence of n-ach on the feedback performance relationship. He found that performance was significantly related to increases in feedback and in goal specificity for high n-ach subjects, and to participation in goal setting for low n-ach subjects.

Matsui, Okada, and Kayuyama (1982), had 91 undergraduates undergo a perceptual speed task lasting 15 minutes with feedback given after 7½ minutes of work. They found that only the subjects with high n-ach performed better after the feedback.

Other personality variables have also been shown to influence the relationship. Shrauger and Rosenberg (1970), found that individuals with high self-esteem improved their performance more than those with low self-esteem following positive feedback.

Following a general review of feedback literature, Ilgen, Fisher and Taylor (1979), proposed a model which suggests that high performers need feedback which emphasises competency and personal control, whereas average and low performers need the emphasis to be placed on extrinsic rewards resulting from performance.

Some researchers in this area argue that focusing on the impact of feedback on performance without mentioning goal setting is pointless, as both must be present for improvements in performance to occur. Locke, Shaw, Saari and Latham (1981) support this view. Following an extensive review of literature on feedback and goal setting they concluded:

> *"...neither KR (knowledge of results/feedback) alone nor goal setting alone is sufficient to improve performance. Both are necessary." (p.135)*

2.1.3 Performance Appraisal (PA)

Despite the continuing frequency of published articles written expressly about it, and the rigour with which proponents of its various formats still argue their cases, performance appraisal (PA) itself is far from being a recent development. Indeed the Wei dynasty of the third century A.D. is reported to have employed an "Imperial Rater" to rate the performance of the official family members. Interestingly, the Chinese philosopher Sin Yu expressed a criticism which despite the intervening years still forms the basis of criticism of many

current appraisal formats. Sin Yu complained:

> *"The Imperial Rater of Nine Grades seldom rates men according to their merits but always according to his likes and dislikes."*
>
> (Patten, 1977, p.352)

A useful summary from an American perspective of the historical events and trends in PA over the past 80 years is reprinted here (Figure 2.1) from DeVries, Morrison, Shullman, and Gerlach (1981, p.12).

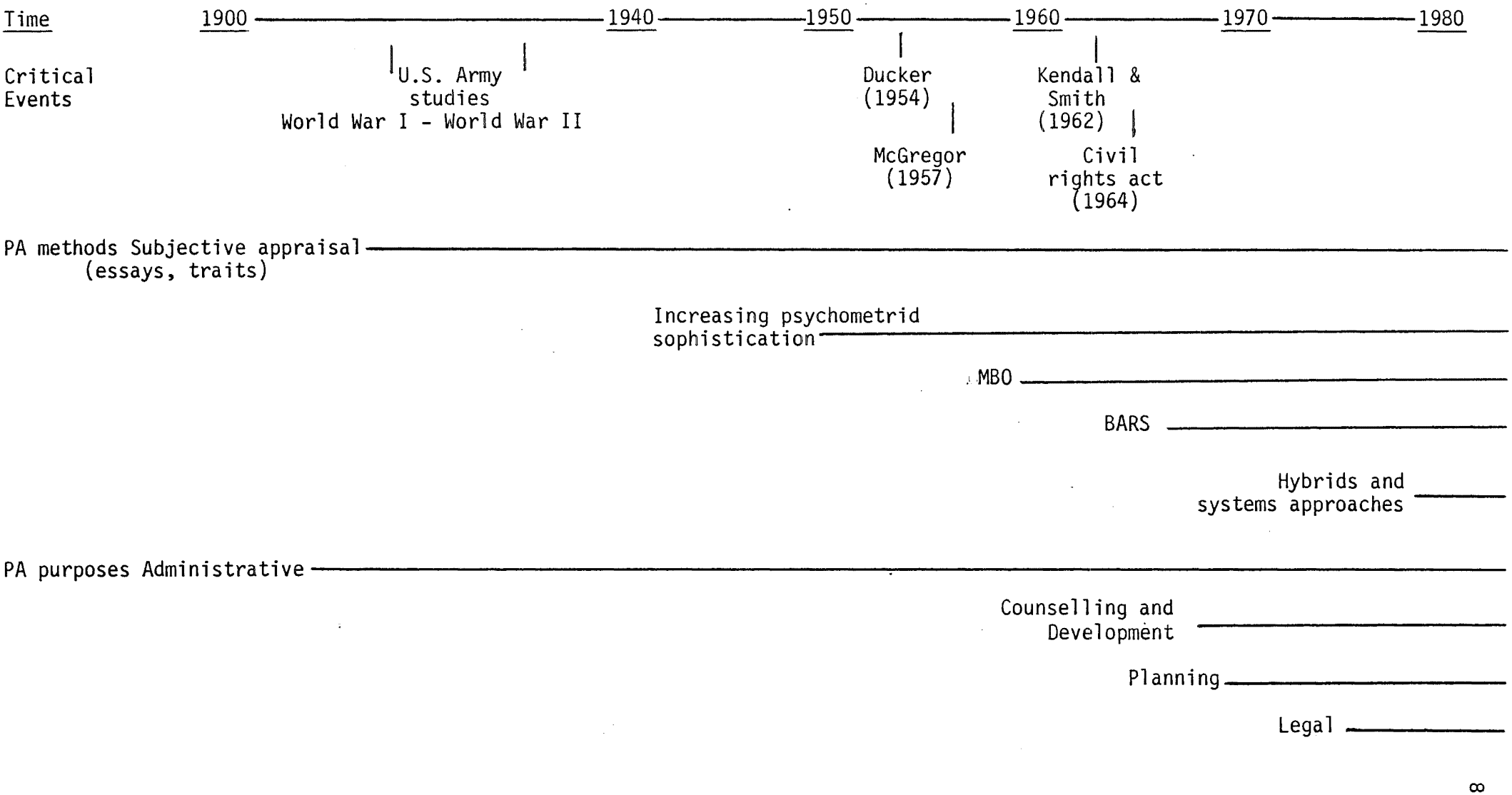
Note that the development of new formats has not led to the demise of existing formats; rather the old continues alongside the new.

The following statement from Latham and Wexley (1981) illustrates the importance and value which many researchers and practitioners attribute to PA:

> *"Selection, performance appraisal, training, and motivation principles form the core of effective human resource systems that affect the productivity of an organization at the level of the individual employee. Of these four systems, an argument can be made that performance appraisal is the most important because it is a prerequisite for establishing the other three. For example, the effectiveness of selection systems is determined by comparing the performance of people on the selection procedures with appraisals of their performance on the job. The job analysis on which the appraisal instrument should be based can reveal important areas where training is needed in the organization. The performance appraisal identifies who in the organization should receive the training. Moreover, it is the combination of performance feedback and the setting of specific goals in relation to this feedback that enables the performance appraisal to fulfill its two most important functions, namely, the training and motivation of employees. Goal setting and feedback are primary components of most, if not all, motivation theories (Locke, 1978)."*
>
> Latham and Wexley (1981, p.11)

In spite of the attention and research which has been focused on PA, particularly over the last few decades, no single format has emerged which has gained universal

Figure 2.1 Historical Events and Trends in PA



acceptance. Nor are there widely accepted standards regarding the: "who", "how often", and the "utility" of PA.

The extremes in PA today would probably range from an informal supervisor/subordinate 'chat', to that part of a comprehensive MBO programme where the appraisals form an integral part of the human resources management within an organisation. Ironically, given appropriate work-settings, both are acceptable forms of PA.

The selection of a PA format is influenced not only by the proven quality of various formats, but also by factors such as the status and work of potential appraisees. In addition to this, a PA format should be compatible with the existing, and any potential developments, in the style of human resources management operating in an organisation.

(i) The psychometric properties of PA formats.

One area of PA research which has attracted considerable attention has concentrated on producing a format which eliminates, or greatly reduces rating errors such as central tendency, and halo errors. (For a review of this research see Landy and Farr, 1980.) Regardless of the work that has been done in the area, to date no single format has been developed which has demonstrated consistently superior psychometric properties.

When first proposed by Smith and Kendall (1963), Behaviourally Anchored Rating Scales (BARS), looked promising in their ability to resist rating errors such as leniency and personal biases.

BARS formats are developed jointly by supervisors and job incumbents. The procedure involves dividing the job up

into its major components or job dimensions. To each job dimension a scale is attached which ranges from the lowest point indicating unacceptable behaviour to the highest, indicating excellent behaviour. The scales typically contain 5 or 7 points, and alongside each point are examples of behaviour, anchors, which are illustrative of behaviour consistent with each scale point.

It was the job relatedness and behavioural focus of the format which was expected to lessen rating errors. Unfortunately studies undertaken since 1963 to evaluate the psychometric properties of BARS, and comparisons of BARS with alternative formats such as traits-based scales, have failed to produce consistent positive results. (See reviews by Jacobs, Kafry and Zedeck, 1980; and Kingstrom and Bass, 1981). However, a lack of uniformity in the development of BARS has been found, and it may well be that the variety of rating formats and procedures used under the guise of BARS, at least partially accounts for the disappointing and conflicting results (Jacobs et al, 1980).

(ii) BARS feedback

Although BARS fail to stand out in terms of psychometric criteria, there may still be justification for choosing BARS in preference to alternative formats. Beatty, Schneier and Beatty (1977) state:

> *"The void of data on performance appraisal systems to improve performance is no doubt due to the various methodological problems. Yet performance improvement through performance appraisal demands enquiry as it may influence the choice of an appraisal format more than psychometric issues typically assessed." (p.656)*

One aspect of BARS which is considered to be superior to most other types of appraisal formats is that of the

quality of feedback which accompanies it (Hom, DeNisi, Kinicki and Bannister, 1982). Because the focus of the feedback is on concrete behavioural examples of performance rather than personal characteristics or traits, the feedback is more likely to lead to positive behaviour changes. This is due to enhanced interpretability and increased acceptance of feedback by the recipient. Both of these factors were found by Ilgen et al, (1979), to be highly influential on the positive affect of feedback on behaviour.

BARS feedback is more easily interpreted by recipients because the scale dimensions and anchors use concrete behavioural terms, and avoid the abstract and often ambiguous terms frequently found in more traditional formats.

A third positive aspect of BARS feedback is that the establishment of specific goals for improvement is facilitated by BARS feedback as it is easier to focus on specific examples of behaviours which should be either performed or avoided (Schneier and Beatty, 1979; Jacobs et al, 1980).

Empirical study of the behavioural impact of BARS feedback has to say the least been sparse. To the author's knowledge, only three recent studies have focused on this topic.

Beatty et al (1977) found that raters evaluated ratees more positively after ratees received BARS feedback. Unfortunately as the experiment had neither control nor contrast groups, the apparent improvement in ratee performance cannot be attributed exclusively or necessarily even in part to the BARS feedback.

Ivancevich (1980) found that BARS evaluated employees performed better and expressed more favourable attitudes

towards their performance appraisal than employees evaluated with a traits-based rating format. Again, however, methodological considerations limit any claims which could be made about the results. In this case the results may have been contaminated by a novelty effect arising from the fact that while the BARS format was new, the traits-based format had been used for some time by the organisation.

The third study, conducted by Hom et al (1982), produced mixed results. In their study, undergraduates used either a BARS format or a summated rating scale format to rate course instructors. The experiment was conducted twice, once in spring and again in summer. While no format effect was found for the spring study, the BARS rated instructors in the summer study showed greater behavioural change than did their counterparts rated with the alternative format. Although unable to establish definitive reasons for the variations in findings between the spring and summer studies, Hom et al suggest that the following reasons may have had some bearing on the results. Firstly, ratee numbers were small: 32/spring - 19/summer. Secondly, the time interval between receipt of feedback and post test ratings differed, and thirdly summer ratees were possibly better teachers than spring ratees.

(iii) The value of BARS development

Development of BARS formats has been found to be of value to organisations even prior to their utilization in PA. Beatty et al (1977) found that ratees who participated in the development of a BES[1] format, improved their performance

1. Behavioural Expectation Scales (BES) differ from BARS in name only. Essentially BARS and BES refer to the same type of PA format.

both following development of the format and after the format was used to provide performance feedback. Beatty et al (1977) concluded:

> *"Thus one applied advantage of BES is the identification of divergent rater-ratee perspectives (and recall) on ratee performance; which may signal a lack of clear policy and perhaps a failure to have previously tapped the behavioural domain of the job." (p.653)*

This feature of BARS would clearly be of significant value to organisations such as DP firms which operate in a rapidly changing environment. In such organisations, raters' expectations and perspectives on ratee performance could quickly become inconsistent with the job actually performed by the ratee. The job analysis conducted during the initial development of BARS and subsequent reviews of the scales would greatly reduce any divergence of rater-ratee perspectives on ratee performance.

(iv) BARS and DP personnel

Arvey and Hoyle (1974) developed a BARS format for use with 200 programmer/analysts, in a study carried out at a large American computer manufacturing company. Following joint participation of raters and ratees, twelve major job dimensions were identified and used to form the basis of the scales in the format. Arvey and Hoyle concluded that they had been able to produce a format which exhibited adequate Guttman scaling properties, and also demonstrated good convergent and discriminant validity.

The study of Beatty et al (1977) which focused on potential operational advantages of a BES format, used programmer/analysts as subjects. The study found this appraisal format to be effective with such personnel. Beatty et al

also concluded that the operational advantages of BES such as identification of divergent rater-ratee perspectives on ratee performance, should be a crucial factor in the choice of an organisation's PA format.

2.1.4 Determining the Impact of PA on Ratee Performance

One of the methodological problems associated with studying the effectiveness of a new PA format concerns validation. This involves obtaining an independent measure of ratee performance before and after appraisal.

Beatty et al (1977) attempted to show the effectiveness of a new BES format by comparing ratings on the initial administration of the format with the ratings of a subsequent appraisal 6 months later. As expected, ratings on the second appraisal were higher than the first. However, as Beatty et al realised, this finding had two possible explanations. Either, after receiving performance feedback and being shown specific behavioural alternatives to improve performance, ratees were motivated to improve - thus performance actually improved. Or alternatively, development and utilisation of the BES resulted in a convergence of raters' and ratees' perceptions of performance. Thus while ratee performance remained unchanged, raters' perceptions of performance may have become more accurate through development of more specific criteria.

Establishing an independent and objective measure of performance may be facilitated by the nature of some jobs. For example, Ivancevich (1980), was able to measure three different aspects of ratee performance in his study with engineers, by measuring cost, scheduling and grievances.

In this study the independent measure of performance

was to be provided by way of a satisfaction survey administered to the client-users of a computer bureau organisation. The survey was to be conducted prior to the implementation of a new PA format for systems personnel of the bureau organisation and repeated six months later. Measuring change in client-user satisfaction with the systems personnel after the six months would have provided a further measure of systems personnel performance.

2.1.5 Measuring Personnel Satisfaction

Couger and Zawacki (1980) reported having spent two months evaluating various survey instruments before finally settling on the Job Diagnostic Survey (JDS) developed by Hackman and Oldham (1974). Before using the JDS to conduct an extensive survey of DP personnel, Couger and Zawacki expanded it to cover areas specifically related to DP work, and called the modified instrument the JDS/DP.

The JDS/DP appeared to be a virtually tailor-made instrument for use in the proposed study, and so attempts were made to procure a copy of the instrument. When a written request to J.D. Couger went unanswered, it was decided for the sake of expediency to telephone. To the author's surprise, the request for a copy of the instrument was refused on the grounds that the instrument was a proprietary document and not available to the public. This was disappointing as it meant that the results of this study could not be compared with those of Couger and Zawacki. In fact without access to the same survey instrument, no attempt can be made by independent researchers to replicate the findings of Couger and Zawacki. At the very least this

must surely cast doubt on any claims they have made from their results, and their refusal to allow access to this instrument strikes at the very heart of scientific research ethics.

The short-form of the JDS in its original form was still considered to be suitable for this study.

2.1.6 Summary

DP personnel have been found to be high in n-ach but low in the need for affiliation. Feedback has been found to significantly improve the performance of people with high n-ach.

Despite many years of development, no single PA format has yet been developed which has been found to be consistently superior to all other formats. In use today are formats ranging from the traditional subjective appraisals to modern systems type formats.

One particular format, BARS, although not outstanding in respect of psychometric properties, has been found to be associated with high quality feedback. The behavioural focus of the format is believed to enhance the interpretability and acceptance of the feedback. Research on the behavioural impact of BARS feedback has produced mixed results. BARS have been developed and utilised successfully with DP personnel.

Attempts to determine the impact of PA on ratee performance have largely foundered on methodological problems associated with obtaining an objective measure of ratee performance.

2.2 PART 2

This part of the review begins by briefly looking at available means for measuring the performance or effectiveness of an information system. It then moves onto look at one particular method, namely user satisfaction, and the rather limited research which has been done in this area.

2.2.1 Assessing Information Systems Effectiveness

Utilising information systems, either by way of an in-house computer or through the services of a bureau, is expensive. Thus failure of an information system to satisfy the requirements of its users is unacceptable. In the former case this will result in an expensive, inefficient department. A bureau which fails to satisfy its clients will suffer a rapid decline in business as those clients go elsewhere for satisfaction. Clearly determining the satisfaction or otherwise of users is of considerable importance to managers of both types of information systems.

User satisfaction is a perceptual or subjective measure of system effectiveness. Objective criteria such as cost/benefit analyses or system usage could be used to measure system effectiveness. However, those methods are susceptible to many intervening variables which reduce their adequacy as criteria (Price, 1972). For example, cost/benefit analyses seldom take into consideration the less obvious but real costs and benefits which cannot easily be assessed in monetary terms. These might include changes in such factors as the reliability of information, and the morale of staff. Similarly system usage can be misleading, when for various reasons, such as a requirement from the user's management,

users are forced to continue using a system they are dissatisfied with.

The following comment from Ives, Olson and Baroudi (1983) highlights an important point:

> *"A "good" information system perceived by its users as a "poor" system is a poor system." (p.786)*

Faced with few alternatives, assessing user satisfaction would appear to be one reasonable method of determining the effectiveness of an information system.

2.2.2 User Satisfaction as a Measure of Systems Effectiveness

A number of studies have used user satisfaction to measure various aspects of effectiveness of in-house computer services (Powers and Dickson, 1973; McKaskill, 1978; Gallagher, 1974; and Lucas, 1975). This approach has also been used to study the effectiveness of university computer centres (van der Hart, 1979; Good, Power and Chen, 1981).

Powers and Dickson (1973), studied the effectiveness of management information systems projects. They measured success according to the following four criteria: impact of the project; financial cost; completion time; and user satisfaction. They found that the user satisfaction criterion was the most important and critical of the four, and concluded:

> *"While it is desirable that any project be kept within time and budget constraints and that it not create undue problems for computer operations, the MIS project is a failure if the end product does not satisfy the manager whom it is to serve." (p.153)*

In a study using 375 managers of a single firm, Gallagher (1974) found user satisfaction to be a useful and valid criterion for determining the monetary value of an existing Management Information System report.

McKaskill (1978) surveyed 138 managers from 21 manufac-

turing companies in a study concerned with user satisfaction with in-house information systems. The survey results were factor analysed to detect underlying user satisfaction components. The factors identified in decreasing order of importance were:

(i) INTERACTION, the quality of the immediate interaction between users and data processing staff.

(ii) SUPPORT, the short-term operational and decision-making support received by the users.

(iii) IMPACT, the perceived level of benefits received by the organisation from its computer investment.

(iv) DESIGN, the quality of the systems work performed by the data processing staff.

Van der Hart (1979) took a marketing approach to measuring the performance of a university computer centre. The centre's performance was measured by the calculation of a performance index for each of 27 service elements. User satisfaction and importance ratings were used to derive index values. The results of the survey suggested that user satisfaction could generally be improved if various user groups could be identified and treated separately.

Power (1981) measured user satisfaction to determine the success of a university computer centre to meet the needs of its users. The study incorporated work done earlier on a similar theme at the same university by Chen (1978). A sample of 301 users was drawn from a population of 829

users. Using a similar methodology to that of McKaskill, (1978). Power factor-analysed the data from a questionnaire survey. The sample contained two distinct groups of users, one using batch processing facilities and the other using on-line facilities. The results were analysed separately for each group. The factors identified in decreasing order of importance were:

(a) Batch Processing

(i) PEOPLE, the quality of the personal interaction between users and DP staff.

(ii) BATCH, the quality of the operational aspects of the service.

(iii) FAIRNESS, the fairness of the charging algorithm and allocation of resources.

(iv) FUNDS, the provision of computing funds and the charging algorithm.

(b) On-Line

(i) PEOPLE, the quality of the personal interaction between users and DP staff, and the adequacy of computing funds.

(ii) TOOLS, the range and availability of on-line services.

(iii) CANDE, the quality of the operational aspects of the interactive service.

(iv) HELP, the quality of operational and informational support services.

(v) FAIRNESS, the fairness of the charging algorithm and the centres response to problems.

Power, then selected various groups of users according to specific user characteristics such as age, computing experience, and university department. The relative importance of each factor was then computed for each group, in an attempt to identify the specific requirements and their order of importance for users in the various groups. Power reported reasonable success in achieving this objective, with results which were largely specific to the university. Several examples of the variety of findings are: that undergraduates were less satisfied with People and Problems factors than other users; and that Engineering Department users were more satisfied with the location of the batch terminal than Science Department users.

2.2.3 Measuring User Satisfaction

All of the above-mentioned studies used postal administered questionnaires to obtain the majority of the data regarding user satisfaction. Several of the studies provided examples of the questionnaires. However none were universally applicable, as Good, Power and Chen (1981) report:

> *"We found early in the study that the questionnaire needs to be specific to the particular installation being investigated." (p.162)*

McKaskill (1978)and later Power (1981) whose research was modelled along similar lines to that of McKaskill, used factor analysis on the questionnaire data. The aim was to attempt to expose underlying factors which largely explain variance in user satisfaction. Both researchers used the factorscores to select a number of users for follow-up interviews. The interviews were conducted to verify the interpretations given to the factors, and to obtain more detailed information regarding user satisfaction. (The results of these two studied were given earlier in Section 2.2.2.)

A promising development in the area of the measurement

of user satisfaction, for in-house management information systems, is the work of Ives, Olson and Baroudi (1983). They took a questionnaire, which was originally developed by Pearson (see Bailey and Pearson, 1983), and subjected it to extensive testing. The original questionnaire utilised the semantic differential technique, with four adjective pairs for each of 39 scales. The scales corresponded to 39 factors which Pearson had identified as contributing to user satisfaction. As a result of their testing, Ives et al, reduced the questionnaire to one comprising 33 two-question scales. They have also produced a 'short-form' measure.

Ives et al, are currently conducting research to determine its general utility for measuring user satisfaction with in-house information systems.

2.2.4 Summary

User satisfaction has been used as a measure of system effectiveness in a number of studies. The majority of the studies have looked at the effectiveness of in-house computer systems. Several have focused on university computer centre services.

Two studies, those of McKaskill (1978) and Power (1981) used factor analyses of survey data to achieve data reduction and thereby increase the interpretability of the survey results.

The factors exposed by both the McKaskill study, which studied in-house computer users, and the Power study which studied computer centre users, showed similarities, the most significant being that the factor responsible for the greatest amount of variance in user satisfaction exposed by each study, was a factor which was predominantly determined by the interaction of users with DP personnel.

Power further utilised the information generated by the

factor analyses to differentiate service requirements for groups of users selected according to various user characteristics.

Promise is shown in current research by Ives et al (1983), to produce a universally applicable questionnaire for measuring user satisfaction of in-house system users.

CHAPTER THREE

STUDY 1

3.1 RATIONALE

From the literature on DP personnel a picture of the typical programmer/analyst emerges as a person, male or female, who has a high level of n-ach but tends to shy away from social contact. The literature of feedback suggests that such personnel are likely to perform best when they receive positive feedback which emphasises competency and personal control.

This need for feedback which emphasises personal control, coupled with the low need for affiliation typical of such personnel, restricts the type and frequency of feedback which can be provided by agents. Overly frequent feedback would have the effect of both reducing personal control, and causing discomfort for the employee through the amount of contact between employee and agent necessary for frequent feedback. For this reason, the feedback provided during formal PA sessions is likely to be a major source of feedback from an agent that programmer/analysts receive. It is therefore important that the type of PA format used is one which provides satisfactory feedback on performance.

The PA format in use at the study site prior to the commencement of the study, was a traits-based rating scales format.

Although no single PA format has been found to be

consistently superior in respect of psychometric properties, a number of researchers have concluded that the quality of feedback from BARS is superior to that of many other formats. Thus one objective of this study was to compare ratee satisfaction with feedback received from BARS against feedback received from a traits-based rating scale format.

The hypothesis to be tested states: 'That subjects who are appraised using a BARS format will show increased satisfaction with feedback from agents, while the satisfaction of subjects appraised with a traits-based rating scale format will remain unchanged'.

A second objective of the study was to assess the behavioural impact of BARS feedback. To date only a paucity of research has been done on this topic. A factor which no doubt significantly contributes to this deficiency of research is that obtaining an independent and relatively objective measure of performance is often difficult, particularly for professional jobs. The independent measure of personnel performance in this study was to have been derived through the surveying of bureau clients' satisfaction with the service they received. It was expected that an improvement in bureau personnel performance would be reflected in an increase in client satisfaction.

To assess client satisfaction, a questionnaire was developed and administered to bureau clients nationwide. Originally it was intended that this questionnaire would again be administered six months after a BARS format had been implemented, to provide follow-up data. Unfortunately for the following reasons it was not feasible to administer the questionnaire for a repeat measure.

First, the administration of the questionnaire to more than 800 users throughout the country, proved to be considerably more time-consuming and more expensive than originally anticipated. Second, and most importantly, had the questionnaire been repeated six months later, it is highly likely that return rates would have been extremely low, this being primarily because six months would have been insufficient time for most users to notice a significant change in the service provided by the bureau. This was not anticipated at the outset as it was not until the results of the first survey were analysed that it was realised just how highly satisfied the majority of the users already were. The general level of satisfaction was such that any improvement in service would have needed to have been quite dramatic to have produced a significant impact on user satisfaction after such a short time.

So essentially for cost-benefit reasons it was decided not to proceed with the follow-up survey.

3.2 METHOD

3.2.1 Study Site and Subjects

The host organisation for this study was a computer bureau group, which operates semi-autonomous bureaux in each of four cities: Auckland, Hamilton, Wellington and Christchurch.

The personnel of interest to this study were the programmer/analysts from the systems departments. In June 1984, personnel numbers for this group at the bureaux were: Auckland 16; Hamilton 12, Wellington 9; and Christchurch

16. Both sexes were approximately equally represented within the sample with ages ranging between 20 and 40 years. Although there were slight variations between the sites, supervisor/subordinate ratios were approximately 1:6.

Auckland and Wellington were designated as control groups and Hamilton and Christchurch as experimental groups. This resulted in fairly similar subject numbers between the groups, and it also enabled much of the study work to be developed locally at the Christchurch bureau which was helpful from a practical point of view. While the work carried out by systems personnel was much the same from bureau to bureau, variations in factors such as management style and physical working conditions did occur to some extent. It was not possible in this study to attempt to control for such variables.

3.2.2 The Personnel Satisfaction Measure

The Short Form of the Job Diagnostic Survey (JDS) as developed by Hackman and Oldham (1974) was selected to measure personnel satisfaction in general, and in particular feedback from agents. An additional section was included which contained questions specifically related to the work of the subjects (see Appendix 1). As well as being of interest to the bureau managers, the responses to this additional section were expected to be of value to the study later on, when explanations were sought for any changes in user satisfaction.

3.2.3 Administration of the Modified JDS

The questionnaire was administered to all subjects in the first week of June 1984, prior to the commencement of all

other parts of the study. The author personally administered and collected all questionnaires, except where subjects were absent on the day of the author's visit. These subjects completed the questionnaires and forwarded them by post, as soon as possible. To ensure truthful responses, subjects were not asked to supply their names, thus preserving anonymity. To avoid the results being affected by subjects who were unlikely to be with the company six months further on, the author requested that anyone who considered that he/she may fall into this category should indicate this with a note somewhere on the questionnaire. Such questionnaires were not included in the analysis.

The second administration of the questionnaire was conducted in the second week of February 1985. Following each administration of the questionnaires, reports of the results were sent to the relevant managers of each bureau.

3.2.4 The Original PA Format

The PA format in use with the company at the start of the study was a largely traits-based rating scales format, with a page each at the rear for the comments of the rater and the ratee. The company had been using the format unaltered for the previous six years (see Appendix 2).

3.2.5 Development of the BARS Format

Although it is desirable that BARS formats are developed on site wherever they are to be used, for practical reasons this was not possible in this case. Instead, it was decided that the format would be developed at Christchurch, and then introduced to Hamilton where

changes would be made according to the wishes of supervisors and job incumbents at that site.

The author held meetings with systems personnel of both sites where the relative merits and disadvantages of using a BARS format for PA were discussed.

Using a procedure detailed by Schneier and Beatty (1979) the scales were developed by the author together with three supervisors and three job incumbents. The group met five times over a period of two weeks, for sessions lasting between 30 minutes and two hours. When completed the scales were distributed to all relevant job incumbents for their perusal and criticism (see Appendix 3).

A copy of the scales was sent, on disc, to Hamilton. The supervisors[1] at Hamilton were requested to look over the scales, show them to the job incumbents, and make changes as they considered necessary. No alterations were made to the scales at Hamilton.

3.2.6 Utilisation of the BARS Format

During the course of this study the usual bi-annual PA was conducted at Auckland and Wellington, once in July 1984 and again in January 1985. The appraisal format used was that which was described earlier, and which had been in use with the company for six years.

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1. The author had previously spent several hours discussing PA in general and the means of developing BARS with the supervisors at Hamilton. They were therefore competent to recognise the need for, and to make changes where necessary.

At Christchurch, where the BARS format had been developed, the mid year appraisals using the BARS format were not held until late August/early September 1984. This unfortunately occurred as a result of the systems manager at Christchurch being absent for six weeks due to illness. To establish whether this delay in the appraisals being conducted might have affected the subjects' attitudes towards the appraisals, the author interviewed a supervisor and several job incumbents. The general feeling was that although job incumbents had been a little disappointed at the delay in the timing of the appraisals, it was unlikely that the delay had had any lasting affect on attitudes towards the appraisals.

The next appraisals at Christchurch occurred in January 1985 and proceeded smoothly.

Using the BARS format, the mid-year appraisals at Hamilton were conducted in July 1984. The supervisors at this bureau reported having some difficulty using the scales. They considered some of the anchors to be ambiguous, mis-graded, and/or misplaced. Apart from these problems the supervisors reported the format to be useful, particularly as it provided a structured platform for the appraisals.

The author made a number of requests to the supervisors of the Hamilton bureau, to review the scales and make alterations where necessary before the next appraisals were conducted. The supervisors failed to do so, and consequently when conducting the January 1985 appraisals they encountered the same problems as they had during the previous mid-year appraisals.

In February 1985 the author met with the supervisors

and job incumbents of the Auckland and Wellington bureaux for the purpose of introducing the new PA format. The relative merits and disadvantages of using BARS were discussed, and instructions given on its use. The format is now in use at all four bureaux.

3.3 RESULTS

One of the two criteria chosen to assess the effectiveness of the BARS format was that of personal satisfaction with feedback from agents. The JDS was used to provide a measure of this satisfaction.

T tests were conducted on the results using the formula for independent means:

$$t = \frac{(\bar{X} - \bar{Y}) - (\mu_x - \mu_y)\ \text{hyp}}{\sqrt{\frac{\Sigma\chi^2 + \Sigma y^2}{(n_x - 1) + (n_y - 1)} \left(\frac{1}{n_x} + \frac{1}{n_y}\right)}}$$

$$(df = n\chi + n_y - 2)$$

A test for independent means was required because the questionnaires were completed and returned anonymously.

Table 3.1 gives the mean scores from a scale of 1 - 7 for satisfaction with feedback from agents. Question 6 of section one, and questions 10 and 7 of section two from the JDS are used to provide this measure of satisfaction with feedback from agents. The results of both surveys for each bureau are recorded.

Table 3.1 Mean scores for satisfaction with "feedback from agents"

Bureau	S U R V E Y June 1984 N		S U R V E Y February 1985 N		t score	Significance
Auckland	16	4.5	12	4.3	0.48	NS
Hamilton	12	3.8	9	4.3	1.02	NS
Wellington	9	4.0	6	4.2	0.29	NS
Christchurch	16	4.5	12	5.2	*2.22	p<.05

Christchurch was the only bureau to record a statistically significant positive change in satisfaction. The trend at Hamilton was reasonably strong and in the same direction as the change at Christchurch. Auckland and Wellington showed negligible change in either direction.

3.3.1 Test of Hypothesis

Hypothesis: That subjects who are appraised using a BARS format will show increased satisfaction with feedback from agents, while the satisfaction of subjects appraised with a traits-based rating scale format will remain unchanged.

The hypothesis is generally confirmed. Auckland and Wellington results show negligible change while the results for Hamilton and Christchurch were in the predicted direction although only those for Christchurch were statistically significant.

3.3.2 Additional Data Obtained from the JDS

A measure of systems personnel satisfaction was taken

twice using the JDS shortform with an interval of seven months between the first and second administrations. The objective was to record any changes, which had occurred over the seven month period, in the job characteristics variables, task significance, task identity, autonomy, and variety, and the measures of specific satisfaction such as pay and security. It was expected that changes in these variables would have provided assistance in understanding any changes, which might have occurred over the seven month period, in levels of bureau user satisfaction as measured by the user satisfaction survey. However, as explained previously in this chapter (see Section 3.1), the user survey was not administered a second time, with the result that much of the data obtained from the JDS became superfluous.

The reason that the JDS shortform was administered in full the second time, rather than simply the section measuring 'feedback from agents', was that the bureau managers expressed interest in obtaining summary measures of a number of variables for comparison with the earlier work. However, some of these data are presented for interest in this report. Tables listing the mean scores and standard deviations for the variables measured by the JDS for each of the bureaux appear in Appendix 4.

3.4 DISCUSSION

There are possibly a number of reasons why satisfaction at Hamilton did not increase to a similar extent as at Christchurch. One of the major reasons is likely to be that the BARS format was 'imported' into Hamilton rather

than developed on site. Even the minor problems which arose as a result of this may have had an adverse impact on the effectiveness of the format.

To get some idea of how these problems might have affected the appraisals, two job incumbents at Hamilton were interviewed in February. They both expressed largely positive feelings about the format, mentioning in particular that the scales made the appraisals more thorough and more job related than previous appraisals. However, both also expressed mild frustration that some of the scales could not be used properly because they contained anchors which for one reason or another either they or their supervisor considered inappropriate.

It would seem reasonable to expect that an appraisal format which cannot be utilised properly because it is considered to be faulty, is unlikely to elicit maximum satisfaction with feedback from its appraisees.

There exists a methodological problem in this study which was also an issue in the research of Ivancevich (1980). While the BARS format was new, the traits-based format had been in use with the company for six years, and thus the results may have been contaminated by a novelty effect. While it is a reasonably serious methodological issue, it was considered to be impractical to attempt to control for this potential variable, bearing in mind that the study sites were commercial organisations. It must simply be accepted that the changes in subjects' satisfaction with feedback from agents at the experimental sites may have been influenced to some extent by a novelty effect.

Finally, one must acknowledge that the sample sizes within the four groups were small and this obviously could have an effect on the results obtained.

CHAPTER FOUR

STUDY 2

4.1 RATIONALE

There were two major objectives for embarking on the user satisfaction survey. Firstly a before and after measure of satisfaction was required to provide an objective measure of the effectiveness of a new PA format developed as part of Study 1. Secondly, the work of two earlier researchers McKaskill (1978), and Power (1981) had shown that similar underlying factors account for the satisfaction of users of both in-house computer services and university computer centre services. A logical progression from this research was to look at the satisfaction of users of a commercial computer bureau.

The investigative procedure developed by McKaskill and later adopted by Power, appeared to provide useful results. It was decided to use the same procedure, and this would also facilitate any comparisons which might later be made.

Because of the variety of client users which a commercial bureau has, it was considered likely that various aspects of the services provided would be of greater or lesser importance to specific groups of users. Attempting to identify any such aspects of the services was an objective, and it was expected that factor analysis of the survey results would facilitate the attainment of this objective.

4.2 METHOD

The procedure developed by McKaskill (1978) which was adopted, involved three steps:

Step 1: The users are surveyed by way of a questionnaire, administered by post.

Step 2: Analysis of results, utilising factor analysis.

Step 3: A sample of users are selected, according to their factorscores for follow-up interviews.

4.2.1 Study Site and Subjects

To achieve the objectives of Study 1, it had been necessary to find a site where both an experimental and a control group could be established. For this reason a computer bureau group with semi-autonomous bureaux at four separate locations had been selected.

The client users who were the subjects for Study 2 came from a wide variety of more than 16 distinct industry sectors. User companies varied in size from companies employing less than 20 to more than 1000 staff members. Monthly expenditure with the bureaux ranged from companies which spent less than $100 to companies which spent more than $10,000 monthly with the bureau.

The bureaux offered eight distinct services, only four of which were utilised by a significant number of users, and these became the focal services for the survey. No attempt was made to assess satisfaction with the other four services, as user numbers for each service were small. The names given to the four services for the purpose of this study were:

Compay/Payroll - This was a batch operated service. Users could carry out their own data preparation or leave it to the bureau. Output was in the form of detailed payslips.

Timeshare - This involved an interactive service between the user and bureau. Equipment was leased from the bureau.

Package - This involved the use of existing software packages. Modifications to packages could be requested.

Developed - This referred to software written and maintained by the bureau for a user.

Also supplied or at least available, where applicable, for each of the above services were: user manuals; training courses; and a consultancy service.

4.2.2 The Questionnaire

When developing the questionnaire, those of earlier researchers (Chen, 1978; Power, 1981) and one from a survey which the host organisation had previously administered were consulted (CBL Survey, 1983). An initial draft of the questionnaire was administered to a number of users as a pilot study. As a result several changes were made before the final draft was settled on.

The questionnaire (see Appendix 5) was divided into seven sections:

Section 1 'Compay' contained 10 questions which were responded to by 357 users.

Section 2 'Timeshare' contained 7 questions which were responded to by 111 users.

Section 3 'Package' contained 7 questions which were responded to by 100 users.

Section 4 'Developed' contained 9 questions which were responded to by 87 users.

Section 5 'Staff' contained 8 questions which were responded to by 447 users.

Section 6 'Impressions' contained 9 questions which were responded to by 436 users.

Section 7 contained 3 questions which were included to obtain user biographical data.

The final page requested information which would identify the user and also indicate the user's willingness or otherwise to be interviewed at a later stage. This section was optional, thereby allowing users to retain anonymity if this was desired.

In July 1984 the questionnaire, together with covering letters, was sent to 811 users of the four bureaux. At the due date, 20 July, a reminder letter was sent to non-respondents. A total of 460 (57%) valid returns and 23 (3%) invalid returns were eventually received. This was slightly less than the response rates for valid and invalid returns achieved in similar studies by Chen (1978) of 187 (63%)/22(8%) and Power (1981) of 192 (64%)/20(7%).

An examination of the reasons given by respondents who returned invalid questionnaires provided some insight into possible reasons for non-response. Twenty-three such questionnaires were received with reasons given such as: 'no longer a client'; 'now have own in-house system'; 'has been completed by the group manager'; and 'appropriate

person on holiday'. One user replied rather caustically:

> *'We would make the point that we don't deal with Companies purely to complete Questionnaires and as the Hamilton Office will tell you, we regularly communicate with them on matters that are both to our satisfaction and not to our satisfaction.'*

The results suggested one source of error and one possible source of bias. First, the number of users to whom the questionnaire was sent was inaccurate, as it contained the names of companies who were no longer users. Second, users who maintained close contact with their bureau may not have bothered to complete the questionnaire, believing that their feelings were already well-known.

The inaccurate number of users would not have affected the results, except to the extent that the response rate would have been greater if only current users had been sent the questionnaire. What affect the one possible source of bias identified might have had is not clear, as there are many reasons why a user might have had regular contact with the bureau. For example, it might have been because the user was dissatisfied or it might simply have reflected the quantity of business the user was conducting with the bureau. Whatever the reason, it seems unlikely that this possible source of bias would have greatly affected the results.

4.2.3 Descriptive Analyses of the Survey Results

All questionnaires were checked upon receipt to identify any users who by response or comments indicated that immediate attention was required. The names of all such users were forwarded to the appropriate bureau.

Responses were typed directly from the questionnaires onto disc. These data were then incorporated into a permanent SPSS system file which also contained extensive data definition information, such as names and descriptive labels for variables (see Nie, Hull, Jenkins, Steinbrener and Bent (1973). This established the data base from which future analyses were conducted. Using the SPSS subprograms 'Frequencies', 'Condescriptive', and 'Breakdown', tables were produced providing summary statistics of users' responses by bureau and nationally. The summary statistics included frequency distributions, mean responses, comparisons of means by bureau, and standard deviations.

The marketing manager of the host organisation and the author used the summary statistics to produce a report on the survey results. This report also contained in a condensed format, the comments made by respondents. Copies of the report were distributed to the management of each bureau in August 1984.

4.2.4 Factor Analyses of the Results

To this point, analysis of the questionnaire results had produced information regarding users' levels of satisfaction with all aspects of the services provided by the bureaux. This information alone was of significant value to the host organisation. However, it provided little assistance in investigating the causes of variance in user satisfaction. It was to achieve this end that factor analysis of the data was conducted.

In utilising factor analysis, one is attempting to identify any underlying factors which account for significant levels of variance in respondents' scores. Thus the objective in using factor analysis with this study was to identify specific aspects of the services provided by the bureaux which were the underlying determinants of variance in user satisfaction. Factor analysis had been used for this purpose previously by both McKaskill (1978) and Power (1981).

All analyses at this stage were conducted using the SPSS subprogram 'Factor'. An ample range of methods and considerable control over the action of the algorithms is allowed by this subprogram.

The first consideration when conducting factor analysis is to decide which respondents and which variables are to be analysed. In this study there was interest not only in the responses of all users in general but also of specific groups or categories of users. Thus analyses were conducted on the data of users in general and smaller user groups selected according to criteria such as industry sector, and size of organisation. In addition to this, analyses were conducted on data separately for each bureau.

Power (1981) also looked at selected user groups, although the statistical procedure he used was different. Rather than conducting separate factor analyses for each user group, Power simply extracted factorscores for the factors identified from the total sample analyses, for selected user groups. Comparisons of factorscores between user groups were then made, from which conclusions were

drawn regarding the importance of the factors for each group. Inherent in this procedure is the assumption that the same factors identified as being underlying for the total sample are also present for smaller selected user groups. Unless this assumption is verified in some way, the conclusions drawn from the comparisons must be of doubtful value. Power made no mention of an attempt to verify this assumption.

The variables used in the analyses were taken from the first five sections of the questionnaire. Sections 1-4 dealt with specific services and therefore only data from users of these particular services were included in any analyses. Section 5 was completed by all respondents. Selection of variables was restricted to individual sections or combinations of sections and no attempt was made to analyse specific questions from sections.

Clearly the number of possible permutations for analyses was large. Although the actual mechanics of the analyses were done by computer, considerable time was required to run each analysis and subsequently to interpret the results. For this reason care was taken in deciding on the criteria for selecting respondents as the number of analyses conducted was directly related to this. Even with every effort being made to minimise the number of analyses run, close to 100 separate analyses were conducted.

(i) Factoring method used

In selecting a factoring method, the author took heed of the following advice from the SPSS authors:

> *"It may be noted that PA2 can handle most of the initial factoring needs of the user. At present this is the most widely accepted factoring method. Those who have limited experience with factor analysis might do well do stay with this method."*
>
> (Nie et al., 1975, p.480)

Thus principal factoring with iteration (PA2) was the method used in this study. Missing data were excluded from the correlation matrix, by pairwise deletion.

The number of factors to be extracted was restricted by use of Kaiser's criterion. This rule restricts the extraction of factors to those having latent roots greater than one. In addition to this, in some analyses the number of factors to be extracted was restricted to a specific number. This resulted in more interpretable factors being extracted. This is an accepted practice as indicated by Kaiser:

> *"...it is possible to discard some of the trivial and uninterpretable factors even after rotation."*
>
> (Kaiser, 1963, p.482)

Following experimentation, it was decided to use varimax, an orthogonal rotation method. The effect of rotation was to simplify the composition of factors.

(ii) Identification and interpretation of factors

A factor is identified by establishing which variables load significantly on it. In this study the criteria for significance was a factor loading of ± .4.

Interpretation of factors involves considering what relationships might exist between the variables which load significantly on a factor and how these variables

might differ from the variables which do not load the factor.

4.2.5 The Follow-up Interviews

> *"...it is important to avoid the circularity resulting from the use of factors as the only source of validation. Some external criteria are essential for substantiating factor content."*
>
> (Child, 1970, p.9)

Validation of the factors in this study was achieved by way of follow-up interviews with a selection of users.

A second reason for conducting follow-up interviews was that a questionnaire, at best, will only provide a researcher with respondent's answers to the limited set of questions which make up the questionnaire. Thus the interviews were required to provide a greater depth to the existing level of understanding of user satisfaction.

A request was made in the questionnaire for users to indicate whether or not they would be prepared to be interviewed. Only those who responded positively were considered in this part of the study. Approximately 70% of survey respondents indicated a willingness to be interviewed.

Users were selected for interviewing following a review of the factorscores of all users on the major factors identified. To do this a program was run to produce a printout which listed beside user identification numbers, their scores on each factor.

It was decided that the most valuable information would be obtained from those users with extreme scores on

particular factors. The lists of factorscores were divided into deciles and then users who scored in the top 2 or bottom 2 deciles were selected out. In addition to this a number of users who scored in the 5th or 6th deciles were also chosen. This produced a list of users who could be considered as being extreme, one way or the other, together with a number of moderate scorers, for each factor. Many users made use of more than one service, and it frequently occurred that an 'extreme' user on one service was 'moderate' on another, and vice versa. Thus this selection method provided a reasonably broad coverage of users in an economical manner.

The list was reduced following consideration of practical matters such as the physical location of the user company. Only companies situated within the bounds of one of the four study site cities were retained.

Twenty-three users were eventually interviewed. The author conducted all of the interviews alone except for the Christchurch interviews where another researcher, Mr. John Good[1] also participated. The interviews which generally lasted up to one hour were unstructured, although a basic checklist, similar to the following, was maintained to ensure that major aspects were covered:

- Introduction reason for interview.
- Ask user to describe the nature of his or her business.

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1. Mr. Good is the Director of the Computer Centre at the University of Canterbury. His participation in this study stems from his active interest in the area of user satisfaction. He was also actively involved in the research of both Chen (1978) and Power (1981).

- What are the positive aspects of the service?
- What are the negative aspects of the service?
- Who would they contact if they had problems?
- Describe contact with the marketing department.
- Query any interesting comments made by the user on the questionnaire.
- Can the user suggest any possible improvements?
- Conclude with positive comments about the assistance of the user.

Although the list of users to be interviewed had been finalised by the middle of November, timing of annual company holidays resulted in the interviews being delayed until late January and early February 1985. While this situation was undesirable it is unlikely that user attitudes changed significantly in the intervening two months.

4.3 RESULTS

4.3.1 Questionnaire Results

Many of the analyses conducted on the questionnaire results involved comparisons between the bureaux. While of value to the host organisation, the comparisons are of little significance for the overall study, and therefore only the combined results will be presented here.

The following tables provide mean satisfaction scores for each of the major sections of the questionnaire. The response scale for each section of the questionnaire ranged from 1 - extremely dissatisfied through to 7 - extremely satisfied.

Although only twelve industry sectors were actually specified on the questionnaire, six additional sectors were identified from the "others" option and these were accordingly separated at the time of coding. Table 4.1 provides a breakdown of users by industry sector and service.

Table 4.1 User Numbers by Industry Sector and Service

Industry Sector		SERVICE			Total
		Payroll	Time-share	Package	Developed	
01	Manufacturing	149	28	28	20	170
2	Legal	2	11	13	2	18
3	Accountancy	4	7	8	4	10
4	Wholesale distribution	34	13	12	15	41
5	Retail	24	4	3	4	30
6	Construction	16	2	1	2	17
7	Transport	15	2	2	2	16
8	Finance	1	4	2	1	5
9	Engineering	8	2	2	3	11
10	Insurance	7	5	3	2	9
11	Service	47	24	21	20	69
12	Local government	8	3	1	7	14
13	Hospital - Rest home	8	3	1	3	11
14	Printer	3	0	0	1	4
15	Hotel	25	1	0	1	25
16	Religious organisation	2	1	1	0	3
17	Educational organisation	0	1	2	0	3
18	Research	3	0	0	0	3

Table 4.2 Mean Scores for Payroll Section
N = 357

Question Number	Topic	Mean Score	Std Dev.
1.1	Meets user's needs	5.8	1.1
1.2	Reliability of payroll service	6.0	1.2
1.3	Cost effectiveness	5.6	1.1
1.4	Suitability of reporting formats	5.5	1.4
1.5	Ease of use	5.5	1.3
1.6	Quality/Content of User Manual	5.3	1.5
1.7	Quality/Content of Training Courses	5.3	1.5
1.8	Turnaround/Performance	6.0	1.0
1.9	Quality of data prep service	5.8	1.1
1.10	Assistance during implementation	5.7	1.6

Table 4.3 Mean Scores for Timeshare Section
N = 111

Question Number	Topic	Mean Score	Std Dev.
2.1	Meets user's needs	5.5	1.3
2.2	Cost effectiveness	4.6	1.6
2.3	Availability of machine resource	5.1	1.5
2.4	Reliability of service	5.5	1.3
2.5	Response time/Performance	4.2	1.7
2.6	Security of data	6.0	1.0
2.7	Assistance during implementation	5.6	1.4

Table 4.4 Mean Scores for Package Section
N = 100

Question Number	Topic	Mean Score	Std Dev.
3.1	Meets user's needs	5.6	1.2
3.2	Cost effectiveness	5.2	1.3
3.3	Reliability of software	5.5	1.4
3.4	Ease of use	5.7	1.1
3.5	Quality/Content of user manual	4.9	1.6
3.6	Quality/Content of training courses	4.8	1.6
3.7	Assistance during implementation	5.4	1.6

Table 4.5 Mean Scores for Developed Section
N = 87

Question Number	Topic	Mean Score	Std Dev.
4.1	Understanding of user's needs	5.5	1.2
4.2	Cost of software development	5.0	1.4
4.3	Reliability of software	5.3	1.3
4.4	Performance of software	5.5	1.1
4.5	Ease of use	5.5	1.4
4.6	Meets user's development timetable	5.0	1.7
4.7	Quality/Content of training courses	4.9	1.3
4.8	Assistance during implementation	5.5	1.5
4.9	Quality/content of documentation	4.7	1.6

Table 4.6 Mean Scores for Staff Section
N = 447

Question Number	Topic	Mean Score	Std Dev.
5.1	Understanding of user's business	5.7	1.2
5.2	Availability of staff	5.5	1.5
5.3	Responsiveness to unusual requirements	5.8	1.4
5.4	Speed of problem rectification	5.7	1.4
5.5	Communication skills of staff	5.9	1.1
5.6	Attitude and manner of staff	6.2	1.1
5.7	Frequency of Mkt.Dept. contact	4.7	1.6
5.8	Effectiveness of Mkt.Dept. support	4.7	1.5

Table 4.7 Mean Scores for Impressions Section
N = 436

Question Number	Topic	Mean Score	Std Dev.
6.1	Old fashioned - Progressive	5.4	1.0
6.2	Low profile - High profile	4.9	1.2
6.3	Poor service - Good service	5.4	1.2
6.4	Short-term solution - Long-term solution	5.1	1.3
6.5	Poor quality products - High qualtiy products	5.4	1.0
6.6	Low ethics - High ethics	5.7	1.1
6.7	Poor management - Good management	5.4	1.1
6.8	Declining company - Growth company	5.7	1.0
6.9	Impersonal - Friendly	5.8	1.2

4.3.2 Results of the Factor Analyses

Using the satisfaction variables of the first four sections separately, but with each including those of section 5, four separate analyses were conducted using all relevant user data. The following tables show the structure of the factors which emerged for each service coupled in turn with the "Staff" (section 5) data. The full factor pattern matrices are given in Appendix 6.

Table 4.8 Structure of the Payroll Plus Staff Factors

Factor	Label		Variable	Loading
ONE	PEOPLE	5.3	Responsiveness of staff	.79
		5.4	Speed of problem rectification	.76
		5.6	Attitude and manner of staff	.70
		5.5	Communication skills of staff	.70
		5.2	Availability of staff	.60
		5.1	Understanding of user's business	.55
		1.10	Assistance during implementation	.44
TWO	SERVICE	1.1	Meets user's needs	.74
		1.5	Ease of use	.70
		1.4	Suitability of reporting formats	.67
		1.2	Reliability of payroll service	.57
		1.8	Turnaround/performance	.55
		1.3	Cost effectiveness	.46
		1.9	Quality of data prep	.45
		1.10	Assistance during implementation	.45
		1.6	Quality/content of user manual	.43
THREE	MKT.DEPT	5.8	Effectiveness of Mkt.Dept. support	.87
		5.7	Frequency of Mkt. Dept. contact	.85

Table 4.9 Structure of the Timeshare and Staff Factors

Factor	Label		Variable	Loading
ONE	PEOPLE	5.4	Speed of problem rectification	.80
		5.5	Communication skills of staff	.71
		5.3	Responsiveness to unusual requests	.71
		5.1	Understanding of user's business	.65
		5.2	Availability of staff	.65
		5.6	Attitude and manner of staff	.58
		2.7	Assistance during implementation	.46
TWO	SERVICE	2.3	Availability of machine resources	.82
		2.5	Response time/performance	.64
		2.4	Reliability of service	.62
		2.1	Meets user's needs	.61
		2.2	Cost effectiveness	.52
		2.7	Assitance during implementation	.42
THREE	MKT.DEPT	5.8	Effectiveness of Mkt.Dept. support	.94
		5.7	Frequency of Mkt.Dept. contact	.87

Table 4.10 Structure of the Package and Staff Factors

Factor	Label		Variable	Loading
ONE	PEOPLE	5.4	Speed of problem rectification	.76
		5.3	Responsiveness to unusual requests	.73
		5.2	Availability of staff	.71
		5.5	Communication skills of staff	.66
		5.1	Understanding of user's business	.63
		3.6	Quality/content of training courses	.60
		5.6	Attitude and manner of staff	.49
		3.7	Assistance during implementation	.45
		3.5	Quality/content of user manual	.41
TWO	SERVICE	3.1	Meets user's needs	.73
		3.4	Ease of use	.57
		3.5	Quality/content of user manual	.48
		3.3	Reliability of service	.48
		3.2	Cost effectiveness	.42
		3.6	Quality/content of training courses	.39
		3.7	Assitance during implementation	.39
THREE	MKT.DEPT	5.8	Effectiveness of Mkt. Dept. support	.90
		5.7	Frequency of Mkt. Dept. contact	.89

Table 4.11 Structure of the Developed and Staff Factors

Factor	Label		Variable	Loading
ONE	PEOPLE	5.4	Speed of problem rectification	.88
		5.5	Communication skill of the staff	.73
		5.1	Understanding of user's business	.72
		5.3	Responsiveness to unusual requests	.65
		5.2	Availability of staff	.60
		4.4	Performance of software	.56
		5.6	Attitude and manner of staff	.53
		4.3	Reliability of software	.47
TWO	SERVICE	4.3	Reliability of software	.62
		4.2	Cost of software development	.62
		4.8	Assistance during implementation	.60
		4.5	Ease of use	.59
		4.6	Meets users development timetable	.54
		4.7	Quality/content of training courses	.50
		4.4	Performance of software	.49
		4.1	Meets user's needs	.48
		4.9	Quality/content of documentation	.45
THREE	MKT.DEPT	5.8	Effectiveness of Mkt. Dept. support	.92
		5.7	Frequency of Mkt. Dept. contact	.88

Where user numbers were adequate, the same four analyses were conducted on user data separated by way of the four bureaux. The results of these analyses were generally highly consistent with the earlier analyses which utilised the full data.

For reasons which will be given in section 4.4.5, the majority of analyses conducted on selected data such as data from users of specific industry sectors, generally failed to produce interpretable factors. Exceptions to this occurred when the user group selected was of a significant size. For example, analyses which utilised the data of users from the 01 industry sector (manufacturing) produced very similar factors to the full data analyses. Analyses with small user groups tended to produce four or five factors, none of which accounted for significant levels of variance, and which were on the whole largely uninterpretable.

Table 4.12 Percentage of Variance Accounted for by each Factor - Service when Combined with Staff

Service	Factor 1 'People'	Factor 2 'Service'	Factor 3 'Mkt. Dept'	Total % Variance
Payroll and staff	39.7%	10.9%	6.8%	57.4
Timeshare and staff	42.6%	10.8%	9.9%	63.3
Package and staff	41.9%	10.8%	9.3%	62.0
Developed and staff	44.6%	12.1%	7.0%	63.7

Table 4.12 shows the percentage of variance each factor accounts on each service. The total % variance column shows the amount of variance on each service which is accounted for by the three factors combined.

4.3.3 The Interviews

Following a brief introduction as to the purpose of the interviews, the user was asked to describe the nature of his or her business. This was important as it helped to establish both the uniqueness and/or commonality of each user in relation to other users. From this the interviewer was able to put into perspective the views of each user interviewed.

While the content of the interviews varied considerably from user to user, a number of aspects of the service were regularly mentioned, indicating that they were aspects of reasonably general concern. The only significant positive aspect which was commonly referred to was that of the attitude and manner of bureau staff. Comments such as the following were common:

> *"You can't fault the attitude of the staff. They're always friendly and courteous."*

> *"They're a great bunch to deal with - always pleasant and helpful."*

However, five aspects of the service were commonly referred to in a negative vein. They were: staff incompetence; poor communication; lack of understanding; staff turnover; and slow response times.

Staff incompetence was often mentioned in the same breath as staff attitude, e.g.

> *"In respect to their attitude they're fine, it's in their ability that they're lacking. - Staff competence, or lack of, is the main issue, not attitude."*

Several users reported a lack of confidence in staff who remained in the bureau or who replaced acceptable staff who had left, e.g.

"Initially we had Mark T. who was excellent, but since he left no one seems to know how to solve our problems effectively."

Poor communication was regularly mentioned. This ranged from a failure of staff to return calls to a lack of notification of the computer going down. This lack of communication was generally attributed to operations staff, although several users had experienced communication problems with systems staff in relation to changes with software.

Frustration over bureau staff's apparent inability to understand adequately the nature of users' businesses was an issue for a number of clients:

"We are probably quite unique as a bureau client because of the urgency of our work, and that is why we have problems. Mike O. was good - he understood the time pressure we work under. The senior managers understand as well, but getting the message across to their staff is another story. Every time we have a problem we have to explain why we need immediate action, and that's just not on - it's really their duty to understand and appreciate the urgency of our work."

A factor which concerned many users was that of bureau staff turnover.

"I think one of their main problems is that they don't seem to be able to keep staff. Every time we ask for someone to come out we get a new person and we have to explain everything from scratch again, and that's frustrating. If we had the level of staff turnover that they must have, I'd be worried."

Most users utilising Timeshare reported being inconvenienced to some extent by slow or unpredictable responsetimes. However, it was not considered to be particularly serious as this comment illustrates:

"Responsetimes can be slow, especially in the middle of the day and the end of the month. Still it's not really a major problem, it's more just an inconvenience we've learnt to live with."

Slow responsetimes were seen as a more serious issue by users who were unable to predict when they might occur, e.g.

> *"Most of the time we can predict when responsetimes are likely to be slower than normal, but occasionally out of the blue responsetimes simply drop off, which leaves the girls working at about half speed. To date it hasn't caused any overly serious problems, but for the amount we're paying them, I think we could expect them to put better controls on Timeshare."*

Users who had one or more bureau staff members whom they knew to ask for by name, when they needed assistance were frequently more satisfied with staff aspects, than were users who simply took 'pot luck' when phoning the bureau for assistance. Users in the latter group were also often concerned with the apparently high level of bureau staff turnover.

The following are good examples of comments typical of users from the two groups:

> *"When we have software problems, we deal with Shirley. She normally gets small problems sorted out immediately, and if its something which is likely to take some time, she normally always keeps us informed as to what she's doing and where she's at. She's good."*

> *"We just contact the FED desk when we have a problem. To begin with we always got the same chap...can't think of his name...but he apparently left and since then we seem to have got a new person each time. Most of the time they're O.K., but occasionally we get someone who tries to fob us off with some sort of feeble excuse - or they give us the impression that they don't want to know about us."*

Users comments regarding the marketing department generally revealed a serious lack of continuing contact. Comments such as the following were common:

> *"When we had the system put in, we had quite a bit of contact with them [Marketing Department] and they seemed pretty good, but that was over a year and a half ago and since then we haven't seen anyone from marketing."*

> *"They're [Marketing Department] O.K. to deal with, but I'd appreciate it if the contact was two-way, I mean, the only way that I find out about something is if I first approach them. It would be nice if they originated the contact occasionally."*

To provide a measure of realiability of the interviews, the notes taken during the interviews were compared with users' actual responses to the questionnaire. Strong consistency was found to exist in the two sources of user comment.

4.4 DISCUSSION

4.4.1 Findings of the Questionnaire

As the analyses of the first returned questionnaires started, several trends began to emerge and these continued to strengthen as more questionnaires came in. Firstly, users were generally very satisfied and secondly, in responding to the questionnaire many of the satisfied users appeared to fail to differentiate between questions within sections. Instead they simply responded with the same scale value for many of the questions of a particular section. Initially it was found that both of these responses may have been due to inadequacies with the questionnaire, rather than accurately reflecting the users' levels of satisfaction. The studies of both McKaskill (1978) and Power (1981) had found average satisfaction levels to be equivalent to the range of neutral to slightly satisfied, while this study recorded average satisfaction levels in the higher range of slightly satisfied to satisfied.

Explanations for the apparently high general level of satisfaction and the apparent failure of many satisfied users to differentiate between questions were sought from

the user interviews. It was soon revealed in the interviews that the questionnaire had reasonably accurately assessed user satisfaction. The general level of user satisfaction was quite simply high. The failure to differentiate came about because many satisfied users view the service they receive as a single entity. For example, rather than conceiving of the payroll service as consisting of data preparation, user manual, reporting formats etc., it is simply thought of as payroll package. On the other hand, users who were dissatisfied or scored around the neutral mark did tend to differentiate between questions. This is logical, as to become dissatisfied a user's attention would initially be focused on one or more specific areas of the service which brought about the dissatisfaction. For this reason a dissatisfied user would develop a greater awareness of the individual parts which comprise a service, than might a satisfied user.

Why bureau users may be more satisfied than either in-house computer users or university computer centre users, is probably primarily related to financial considerations. On the one hand, the link between user satisfaction and economic survival of the service organisation is significantly more direct for the bureau than for either of the other two situations. On the other hand the relationship between subsequent charges and the demands a user places on the service organisation are more directly apparent for bureau users than either of the other two groups of users. Thus not only is there a strong incentive for bureaux to ensure user satisfaction, but also the service expectations of bureau users are probably more realistic than those of users in the other two situations.

In addition, many bureau users have the opportunity to go elsewhere for service if they are or become dissatisfied, which is an opportunity seldom available to users of in-house computers or university computer centres. To this end, the high level of user satisfaction may simply reflect the fact that dissatisfied users have taken their business elsewhere. While this is no doubt partly the case, it is unlikely that it would have been of significant influence, as although in principle users can change to a different bureau, practical considerations frequently make changing infeasible.

4.4.2 Questionnaire - Utility of Results

No questionnaires were returned incorrectly completed, which suggests that the layout and instructions were adequate. Many users made use of the space provided under each question to write comments. The report to management containing the summarised results together with comments in condensed format was reported to be of significant practical value by the bureau managers. It is likely that the same questionnaire will be used for a repeat survey at some date in the future.

4.4.3 Findings of the Factor Analyses

Interpreting a factor involves considering the nature of the variables which load it and those variables which do not. Factor 1 in the four major analyses was consistently highly loaded on satisfaction variables from the staff section. This factor was also loaded, in the first three analyses, on the variable of assistance during implementation from the service sections. This supports the interpretation of this factor, as assistance during implementation

necessitates interaction between users and bureau staff. In applying a label to this factor, the advice of Cattell, regarding interpretation and labelling of factors, was taken heed of:

> *"...it would hardly need to be said - except for some blatant historical instances - that one should not cause confusion by failing to relate current research findings to previous research findings through employing a new term where a highly suitable technical term has already been given - unless a radical new interpretation can be proved."*
>
> (Cattell, 1978, p.233)

McKaskill labelled the primary factor he identified as "Interaction", while Power labelled his "People" (see section 2.2.2). Both of these factors showed strong similarities to each other and to factor 1 of this study. Power's label "People" was adopted by this study as it was considered to convey best the significance of this factor.

Factor 2's highest loadings derived from questions from the sections dealing with the particular services. Accordingly this factor was labelled "Service".

Factor 3's highest loadings were on two questions related to the marketing department, which were in the staff section of the questionnaire. This factor was labelled "Mkt.Dept."

4.4.4 Significance of the Factors

From Table 4.12, which shows the % of variance accounted for by each factor, it is clear that the People factor is of prime importance. This indicates that it is the interaction between users and bureau personnel which is the primary cause of variance in user satisfaction, a finding which is consistent with the findings of both

McKaskill (1978) and Power (1981).

The low percentage of the variance accounted for by the Service factor suggests that the satisfaction of bureau users is not greatly influenced by aspects of the services themselves such as reliability and ease of use. Both McKaskill (1978) and Power (1981) found much greater influence of non-people factors on user satisfaction. This may indicate that bureaux provide superior non-people related service to their users. But obviously there are many other possible explanations which could be offered. For example, some six years separates the research of McKaskill from this study, and in that time there have been considerable changes which would affect service issues such as reliability and cost effectiveness. A survey of in-house computer users today would quite possibly conclude with similar findings to this study. Alternatively it may be that bureau users make use of a lesser number of services than in-house or university users and thus have fewer service aspects to comment about.

The Mkt.Dept. factor posed a problem for interpretation prior to the interviews, because it was noticed that a significant number of users had responded to the two questions on the marketing department,[1] with either 8's or 4's. It was not clear from the questionnaire alone whether a user responding with an 8 (indicating, not applicable) had had no contact and expected no marketing department contact (as might be the case with a subsidiary company user), or whether they had simply had no contact and therefore felt

1. Although labelled as the marketing department, the majority of functions carried out by this department more closely resembled those functions normally associated with a sales department.

unable to comment. Similarly a 4 (indicating, neutral) could either mean that the client was neither satisfied nor dissatisfied with the contact they had had, or that due to lack of contact they felt unable to comment either way.

Nine of the 23 users interviewed had responded to the marketing department questions with either 8's or 4's. When queried about their responses, all nine responded that due to a lack of marketing department contact they felt unqualified to comment and had thus responded with 8's or 4's. In addition to this all but one of the nine expressed discontent with the situation, indicating that greater contact would have been appreciated. From this, it seems not unreasonable to conclude that many users who responded with either 8's or 4's were probably at least mildly dissatisfied with the contact they had with the marketing department.

The emergence of this third factor was not influenced by users who responded with 8's as such responses were treated as missing data and not included in the analysis. Responses of 4 would however have had some influence on this factor, and although 4 was a neutral score, the interviews together with some comments recorded on the questionnaires indicate that many users were indirectly registering dissatisfaction by responding with 4's. Thus the Mkt.Dept. factor is a valid factor and could largely be interpreted as dissatisfaction with the lack of marketing department contact.

4.4.5 Factor Analyses with Restricted Data

In the hope of identifying factors which were specific to particular groups of users, analyses were conducted using

only the data of users selected according to various criteria. User characteristics such as industry sector, and user company size were used as the criteria for selection of groups.

With disappointing regularity these analyses with restricted data failed to produce clearly interpretable factors, the only exceptions being when the criteria used resulted in user groups of significant size being selected for analysis. An example of this was when the users from the manufacturing sector were selected for analysis. This group numbered 149 on the payroll analysis. The composition of satisfaction variables for the factors of this group analysis, closely resembled the makeup of the three factors identified using the full data set.

The failure of the restricted data analyses occurred as a result of the sample sizes being too small to counteract within group variance. This meant that even small numbers of users within a group whose responses deviated significantly from the norm of the group had the effect of obscuring any underlying factors. Because of this it was not possible to identify factors which were either specific to or of varying importance to particular groups of users.

4.4.6 Findings of the User Interviews

The generally high level of user satisfaction indicated by responses to the questionnaire was supported by the interviews. All but one of the users commenced the interview, speaking favourably of the service afforded them, before eventually moving on to specific issues with which they were dissatisfied. The exception was a totally disgruntled user who right from the start made his dissatisfaction known with

the utterance of a curse prior to each mention of the name of the host organisation.

The criterion chosen for validation of the factors was the length of interview time spent discussing specific aspects of the service. For this reason the interviews were largely unstructured which allowed the users to discuss whatever was of concern to them. Initially a record was kept of the length of time users spent discussing topics related to one of the three factors or to any other aspect of the service. After several interviews it was obvious that there was no need to keep such a record as the users spent most of the time discussing staff related issues.

The existence and importance of the People factor was validated by the extent to which users were preoccupied with staff-related issues. Service related issues were occasionally only mentioned following prompting by the interviewer. Even users who had very low scores on the Service factor tended to spend most of the time discussing staff related issues.

Interpretation of the Mkt.Dept. factor was facilitated by the interviews. It became apparent that insufficient marketing department contact was the primary reason for the existence of this factor. Users who scored low on this factor had generally responded with scores of 4 or less to the questions related to the marketing department in the questionnaire. Users in this group were generally dissatisfied because of the lack of contact they received rather than the quality of any contact they had received previously.

Dissatisfaction with the People and Service factors occurred for a variety of reasons, although two trends were particularly noticeable. Service dissatisfaction was frequently

attributable to on-going problems. However, People dissatisfaction could often be traced back to one or two specific incidents in the past which had had the effect of undermining the user's confidence in the competence of the bureau personnel.

In keeping with the relative strengths of the two factors, users with low Service factorscores often expressed dissatisfaction with various aspects of the service but at the same time appeared resigned to the thought that change was unlikely. However, users with low People factorscores were generally more emotional about their dissatisfaction and at least hopeful if not expectant of positive change. It appears therefore that while users will tolerate a certain amount of 'machine inadequacy', human incompetence is much less acceptable.

A point of interest and value which arose from the interviews regarding user-staff contact, was that users with high scores on the People factor could always name at least one staff member whom they would ask for when contacting the bureau, while users with low People factorscores frequently could not name a single member of the bureau staff. If a causal relationship exists here it is likely to occur in one or two ways. On the one hand a user having dealt with a competent staff member is likely to be motivated to remember that person's name in case of future needs. On the other hand simply having close contact with individual staff members is likely to be in itself conducive to positive user attitudes.

One of the causes of the failure of the restricted-data factor analyses was that the within group variance was generally of such magnitude that the resulting factors were uninterpretable. There are many potential issues which may have contributed to

produce the large within group variances, not least of which was the personal characteristics of the primary users, within the user companies, who were also generally the people who completed the questionnaire.

Prior to the interviews it had been assumed that the primary users of similar sized user companies within the same industry sector, would be reasonably homogeneous in terms of status, title, position etc., and hence their requirements would be similar. This assumption proved fallacious as apparent at the interview of the second legal firm user. The primary user at the first legal firm was a secretary who had gradually taken over the computer work as the firm progressed from manual to computerised systems. In contrast, the primary user at the second legal firm was a senior partner who had taken it upon himself to 'computerise' the firm. As can be imagined the requirements of these two primary users varied considerably, the latter requiring far more basic assistance than the former. Significant differences in primary user characteristics were found to exist in other industry sectors as well, but the above was probably the most graphic example uncovered in the interviews.

When one considers the impact that vastly different primary user characteristics, such as those presented here, coupled with differences in user company characteristics, could have on user service requirements, it is not surprising that the within-group variance was so great. The conclusion to be drawn from this is that the initial objective of attempting to identify factors specific to particular bureau user groups was somewhat unrealistic, given the limited sample sizes available.

CHAPTER FIVE

GENERAL DISCUSSION

5.1 STUDY 1

As a method of PA, the BARS method appears to be well suited to DP personnel. At the Christchurch bureau, where the format was developed, few problems were encountered with either the development or utilisation of the format.

One of the most serious criticisms of the BARS method is that its development is excessively time-consuming. While development of the format used in this study was certainly not achieved overnight, the time taken was not considered excessive by either the staff members directly involved in the development or their managers. The general feeling at the bureau was that PA is of sufficient importance to justify, within reason, the time required to develop an acceptable format.

One of the limitations of the BARS method which did surface in this study, is that the format should ideally be developed on-site wherever it is to be used. For economic reasons this was not done in this study and as a consequence problems were encountered with utilisation of the format in Hamilton. The fact that the problems, once recognised, were not immediately rectified resulted from a number of factors. First, the expense for the author to travel to that bureau to oversee correction of the problems would not

have been justifiable. Second, as the author was not a member of the host organisation staff, there was little more that the author could do than simply request that the bureau supervisors rectify the problems. Third, the bureau supervisors obviously did not have the necessary commitment to the procedure to bother sufficiently to correct the problems with the scales.

In hindsight the BARS method, while possibly suitable for DP personnel, is not an ideal PA format for this particular organisation. The organisation has neither a personnel department, nor a senior group manager who is particularly committed to personnel procedures. Because of this, the author envisages that at two of the bureaux, the scales may not be kept under review to the extent they should, with the result that after some time they will become inconsistent with the actual work of the job incumbents. This may lead to the eventual disuse of the format at those bureaux. It is the development and maintenance demands of the BARS method which reduces the suitability of the method for this particular organisation. However, rather than revealing problems with the method, this reflects more the inadequate commitment to personnel procedures in some parts of this particular organisation, a problem which is common in small firms with widely separated units.

When compared with a traits-based scales method, the BARS method appears to provide superior performance feedback from agents, as indicated by the increased level of satisfaction with such feedback recorded for personnel appraisal with a BARS format. What impact the improved

performance feedback may have had, or will have on personnel performance cannot be addressed here, as an effective means for measuring such performance was not achieved in this study.

5.2 STUDY 2

The questionnaire developed for this project proved to be a useful method for obtaining a general feeling regarding user satisfaction. This information together with comments made by users was sufficient for the bureau managers to monitor the overall performance of their bureaux. By altering the content of the questions and sections, where necessary, it is envisaged that the same questionnaire format could be used by other bureaux, for the same purpose.

Factor analysis of the questionnaire data and the follow-up interviews, enabled this research to identify and interpret the main underlying factors accounting for variance in user satisfaction. As with the findings of similar research conducted on in-house computer users, and university computer centre users, the most significant factor was found to be concerned with the quality of the interaction between users and DP personnel.

Factor analyses of selected user groups produced inconclusive results. This occurred because of inadequate sample sizes and the surprisingly heterogeneous nature of the user groups selected.

Although factor analysis played an integral part in this research, a commercial organisation wishing to measure user satisfaction purely from a pragmatic point of

view, could do so effectively without needing to use this statistical technique. The questionnaire, together with selected user interviews, would be sufficient to achieve improved knowledge of user satisfaction than is possible from unsolicited comments and impressions. However, it is hoped that where possible future researchers will continue to carry out factor analyses or possibly multi-dimensional scaling of user satisfaction questionnaire data, so as to further test the findings of this research and those of McKaskill (1978) and Power (1981). For although many people in the DP function may intuitively believe that it is the 'human face' of DP services which is the most significant contributory factor influencing user satisfaction, very little research has actually been conducted to test the validity of such an assumption.

As a final point, the author would like to draw attention to a certain irony which exists in this research.

Throughout the project, the senior bureau managers generally showed little interest in study 1. Instead their interest was focused on study 2. The author believes that had greater interest been shown by the senior managers in study 1, not only would fewer problems have been encountered in the execution of study 1, but the future possible premature discarding, at two of the bureaux, of the BARS format developed in study 1 would be unlikely.

The irony lies in the fact that the major finding of study 2 highlights the need for management attention to be focused on exactly the area which study 1 addressed, namely improvement of the quality of service provided by DP personnel.

CHAPTER SIX

CONCLUSIONS

There were two major objectives of this research, first, to develop and implement a BARS method of PA for DP personnel, and subsequently to compare the effectiveness of this method with an existing traits-based rating scales method, and second, to measure the satisfaction of computer bureau users, and to compare the results with those from earlier studies. An initial intention to use user satisfaction as an independent measure of personnel performance, for the purpose of comparing the two methods of PA, was not fulfilled as a result of the user satisfaction measure not being repeated for cost-benefit reasons.

A BARS format was successfully developed and utilised with the systems personnel of a computer bureau group. Some problems were experienced at one site, due to the fact that the format was not developed at that site. After a period of seven months, personnel appraisals with a BARS format, showed increased satisfaction with feedback from agents, while personnel appraised with a traits-based rating scales format showed no change in their satisfaction with feedback from agents.

The satisfaction of computer bureau users was successfully measured by a questionnaire and to some extent by follow-up interviews. Factor analyses of the questionnaire data revealed that three underlying factors accounted for the majority of variance in the satisfaction

of users at the bureaux. The major factor identified was concerned with the 'human face' of the service provided. This finding was in keeping with the findings of McKaskill (1978) who studied in-house computer users, and Power (1981) who studied university computer centre users.

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APPENDIX 1

THE MODIFIED JOB DIAGNOSTIC SURVEY, SHORT-FORM

JOB DIAGNOSTIC SURVEY

This questionnaire was developed as part of a Yale University study of jobs and how people react to them. The questionnaire helps to determine how jobs can be better designed, by obtaining information about how people react to different kinds of jobs.

On the following pages you will find several different kinds of questions about your job. Specific instructions are given at the start of each section. Please read them carefully. It should take no more than 25 minutes to complete the entire questionnaire. Please move through it quickly.

The questions are designed to obtain <u>your</u> perceptions of your job and <u>your</u> reactions to it.

There are no "trick" questions. Your individual answers will be kept completely confidential. Please answer each item as honestly and frankly as possible.

Thank you for your cooperation.

SECTION ONE

This part of the questionnaire asks you to describe your job, as objectively as you can.

Please do not use this part of the questionnaire to show how much you like or dislike your job. Questions about that will come later. Instead, try to make your descriptions as accurate and as objective as you possibly can.

A sample question is given below.

A. To what extent does your job require you to work with mechanical equipment?

1--------2-------3--------4--------5--------(6)-------7

Very little; the job requires almost no contact with mechanical equipment of any kind.

Moderately

Very much; the job requires almost constant work with mechanical equipment.

You are to circle the number which is the most accurate description of your job.

If, for example, your job requires you to work with mechanical equipment a good deal of the time--but also requires some paperwork--you might circle the number six, as was done in the sample above.

If you do not understand these instructions, please ask for assistance. If you do understand them, turn the page and begin.

1. To what extent does your job require you to work closely with other people (either "clients," or people in related jobs in your own organization)?

1--------2--------3--------4--------5--------6--------7

Very little; dealing with other people is not at all necessary in doing the job.	Moderately; some dealing with others is necessary.	Very much; dealing with other people is an absolutely essential and crucial part of doing the job.

2. How much autonomy is there in your job? That is, to what extent does your job permit you to decide on your own how to go about doing the work?

1--------2--------3--------4--------5--------6--------7

Very little; the job gives me almost no personal "say" about how and when the work is done.	Moderate autonomy; many things are standardized and not under my control, but I can make some decisions about the work.	Very much; the job gives me almost complete responsibility for deciding how and when the work is done.

3. To what extent does your job involve doing a "whole" and identifiable piece of work? That is, is the job a complete piece of work that has an obvious beginning and end? Or is it only a small part of the overall piece of work, which is finished by other people or by automatic machines?

1--------2--------3--------4--------5--------6--------7

My job is only a tiny part of the overall piece of work; the results of my activities cannot be seen in the final product or service.	My job is a moderate-sized "chunk" of the overall piece of work; my own contribution can be seen in the final outcome.	My job involves doing the whole piece of work, from start to finish; the results of my activities are easily seen in the final product or service.

4. How much variety is there in your job? That is, to what extent does the job require you to do many different things at work, using a variety of your skills and talents?

1--------2--------3--------4--------5--------6--------7

Very little; the job requires me to do the same routine things over and over again.	Moderate variety	Very much; the job requires me to do many different things, using a number of different skills and talents.

5. In general, how significant or important is your job? That is, are the results of your work likely to significantly affect the lives or well-being of other people?

1--------2--------3--------4--------5--------6--------7

Not very significant; the outcomes of my work are not likely to have important effects on other people.	Moderately significant.	Highly significant; the outcomes of my work can affect other people in very important ways.

6. To what extent do managers or co-workers let you know how well you are doing on your job?

1--------2--------3--------4--------5--------6--------7

Very little; people almost never let me know how well I am doing.	Moderately; sometimes people may give me "feedback"; other times they may not.	Very much; managers or co-workers provide me with almost constant "feedback" about how well I am doing.

7. To what extent does doing the job itself provide you with information about your work performance? That is, does the actual work itself provide clues about how well you are doing--aside from any "feedback" co-workers or supervisors may provide?

1--------2--------3--------4--------5--------6--------7

Very little; the job itself is set up so I could work forever without finding out how well I am doing.	Moderately; sometimes doing the job provides "feedback" to me; sometimes it does not.	Very much; the job is set up so that I get almost constant "feedback" as I work about how well I am doing.

SECTION TWO

Listed below are a number of statements which could be used to describe a job.

You are to indicate whether each statement is an accurate or an inaccurate description of your job.

Once again please try to be as objective as you can in deciding how accurately each statement describes your job--regardless of whether you like or dislike your job.

Write a number in the blank beside each statement, based on the following scale:

How accurate is the statement in describing your job?

1	2	3	4	5	6	7
Very Inaccurate	Mostly Inaccurate	Slightly Inaccurate	Uncertain	Slightly Accurate	Mostly Accurate	Very Accurate

_____1. The job requires me to use a number of complex or high-level skills

_____2. The job requires a lot of cooperative work with other people.

_____3. The job is arranged so that I do not have the chance to do an entire piece of work from beginning to end.

_____4. Just doing the work required by the job provides many chances for me to figure out how well I am doing.

_____5. The job is quite simple and repetitive.

_____6. The job can be done adequately by a person working alone--without talking or checking with other people.

_____7. The supervisors and co-workers on this job almost never give me any "feedback" about how well I am doing in my work.

_____8. This job is one where a lot of other people can be affected by how well the work gets done.

_____9. The job denies me any chance to use my personal initiative or judgment in carrying out the work.

____10. Supervisors often let me know how well they think I am performing the job.

____11. The job provides me the chance to completely finish the pieces of work I begin.

____12. The job itself provides very few clues about whether or not I am performing well.

____13. The job gives me considerable opportunity for independence and freedom in how I do the work.

____14. The job itself is not very significant or important in the broader scheme of things.

SECTION THREE

Now please indicate how you personally feel about your job.

Each of the statements below is something that a person might say about his or her job. You are to indicate your own, personal feelings about your job by marking how much you agree with each of the statements.

Write a number in the blank for each statement, based on this scale:

How much do you agree with the statement?

1	2	3	4	5	6	7
Disagree Strongly	Disagree	Disagree Slightly	Neutral	Agree Slightly	Agree	Agree Strongly

_____1, It's hard, on this job, for me to care very much about whether or not the work gets done right.

_____2. My opinion of myself goes up when I do this job well.

_____3. Generally speaking, I am very satisfied with this job.

_____4. Most of the things I have to do on this job seem useless or trivial.

_____5. I usually know whether or not my work is satisfactory on this job.

_____6. I feel a great sense of personal satisfaction when I do this job well.

_____7. The work I do on this job is very meaningful to me.

_____8. I feel a very high degree of personal responsibility for the work I do on this job.

_____9. I frequently think of quitting this job.

_____10. I feel bad and unhappy when I discover that I have performed poorly on this job.

_____11. I often have trouble figuring out whether I'm doing well or poorly on this job.

_____12. I feel I should personally take the credit or blame for the results of my work on this job.

_____13. I am generally satisfied with the kind of work I do in this job.

_____14. My own feelings generally are not affected much one way or the other by how well I do on this job.

_____15. Whether or not this job gets done right is clearly my responsibility.

SECTION FOUR

Now please indicate how satisfied you are with each aspect of your job listed below. Once again, write the appropriate number in the blank beside each statement.

How satisfied are you with this aspect of your job?

1	2	3	4	5	6	7
Extremely Dissatisfied	Dissatisfied	Slightly Dissatisfied	Neutral	Slightly Satisfied	Satisfied	Extremely Satisfied

_____1. The amount of job security I have.

_____2. The amount of pay and fringe benefits I receive.

_____3. The amount of personal growth and development I get in doing my job.

_____4. The people I talk to and work with on my job.

_____5. The degree of respect and fair treatment I receive from my boss.

_____6. The feeling of worthwhile accomplishment I get from doing my job.

_____7. The chance to get to know other people while on the job.

_____8. The amount of support and guidance I receive from my supervisor.

_____9. The degree to which I am fairly paid for what I contribute to this organization.

_____10. The amount of independent thought and action I can exercise in my job.

_____11. How secure things look for me in the future in this organization.

_____12. The chance to help other people while at work.

_____13. The amount of challenge in my job.

_____14. The overall quality of the supervision I receive in my work.

SECTION FIVE

Now please think of the other people in your organization who hold the same job you do. If no one has exactly the same job as you, think of the job which is most similar to yours.

Please think about how accurately each of the statements describes the feelings of those people about the job.

It is quite all right if your answers here are different from when you described your own reactions to the job. Often different people feel quite differently about the same job.

Once again, write a number in the blank for each statement, based on this scale:

How much do you agree with the statement?

1	2	3	4	5	6	7
Disagree Strongly	Disagree	Disagree Slightly	Neutral	Agree Slightly	Agree	Agree Strongly

_____1. Most people on this job feel a great sense of personal satisfaction when they do the job well.

_____2. Most people on this job are very satisfied with the job.

_____3. Most people on this job feel that the work is useless or trivial.

_____4. Most people on this job feel a great deal of personal responsibility for the work they do.

_____5. Most people on this job have a pretty good idea of how well they are performing their work.

_____6. Most people on this job find the work very meaningful.

_____7. Most people on this job feel that whether or not the job gets done right is clearly their own responsibility.

_____8. People on this job often think of quitting.

_____9. Most people on this job feel bad or unhappy when they find that they have performed the work poorly.

_____10. Most people on this job have trouble figuring out whether they are doing a good or a bad job.

The following section deals specifically with your work at Datacom.

> Now please indicate how satisfied you are with each aspect of your job listed below. Once again, write the appropriate number in the blank beside each statement.
>
> N.B. Under each statement there is space to put any comments which you may wish to make.

1	2	3	4	5	6	7
Extremely Dissatisfied	Dissatisfied	Slightly Dissatisfied	Neutral	Slightly Satisfied	Satisfied	Extremely Satisfied

_____1. Quality of documentation available to help you.
Comments...

_____2. The system of standards demanded.
Comments...

_____3. Training provided.
Comments...

_____4. Access to, and availability of resources, e.g. lines; terminals; manuals etc.
Comments...

_____5. Project time limits and schedules.
Comments...

_____6. Physical working conditions.
Comments...

_____7. Technical assistance and support from other staff.
Comments...

_____8. Amount of worktime free from disruption.
If dissatisfied, please specify major disrupting events...

_____9. Work mix - e.g. share of development vs. maintenance work etc.
Comments...

APPENDIX 2

THE EXISTING TRAITS-BASED RATING SCALES, PA FORMAT

NAME: .....

DATE OF LAST APPRAISAL: .....

DATE OF THIS APPRAISAL: .....

WORK UNDERTAKEN SINCE LAST APPRAISAL:

CODE	HOURS TAKEN	HOURS ESTIMATED	COMMENTS

PERFORMANCE CHARACTERISTICS

The rating is based on the extent to which the following characteristics have been shown. The rating codes are as follows:

1. Below minimum standards
2. Meets the minimum standards
3. Meets the expected standards
4. Exceeds the expected standards
5. Unobserved

PERSONAL SKILLS

	1	2	3	4	5
1. **INITIATIVE** (capable of thinking and acting without being told, when the situation demands)					
2. **RELIABILITY** (can be counted on)					
3. **THOROUGHNESS** (completes all aspects of a job)					
4. **PRACTICALITY** (plans and actions are reasonable)					
5. **RESOURCEFULNESS** (uses time and resources effectively - gets the job done within the time limits)					
6. **ORIGINALITY** (tries new approaches and ideas)					
7. **ANALYTICAL ABILITY** (works from defined objectives to implemented solutions)					
8. **JOB KNOWLEDGE** (Knows what must be done and how to do it)					
9. **SELF DEVELOPMENT** (Keeps abreast of development in the field					
10. **PERFORMANCE UNDER STRESS** (Able to withstand stressful working conditions					
11. **JUDGEMENT** (ability to discern, analyse and evaluate a situation and arrive at practical solutions					

INTERPERSONAL SKILLS

1. **WRITTEN COMMUNICATION** (written work is literate, clear and concise)					
2. **ORAL COMMUNICATION** (presentation of ideas is clear and concise)					
3. **DEALING WITH EQUALS** (co-operative, considers others opinions, assists others when possible)					
4. **LEADERSHIP** (capable of assuming a leadership role when required)					
5. **PUBLIC RELATIONS** (presents a good image to clients)					
6. **SENSITIVITY** (observant, perceptive, empathetic)					
7. **CO-OPERATIVENESS** (effective in working in group situation)					

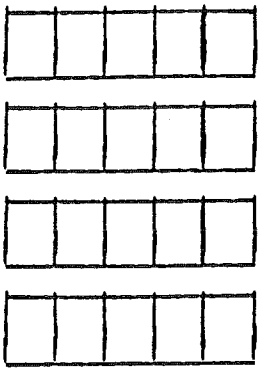
ADMINISTRATIVE SKILLS

1. **DEALING WITH SUBORDINATES** (sets goals and follows up, delegates and ensures understanding, trains)

2. **MANAGERIAL SKILLS** (plans, organises, schedules, documents, presents plans and ideas convincingly)

3. **ORGANISATION & POLICY** (understands, explains and helps establish company policy and procedures)

4. **DEALING WITH SUPERVISORS** (Co-operative, follows standards, reports appropriately)



OVERALL PERFORMANCE APPRAISAL

Prepared By: .....

Date: .....

EMPLOYEE'S COMMENTS

This section may be used by the employee, if she/he wishes, for comments on any aspect of her/his performance appraisal or interview. Such comments should be recorded during the interview. (The manager should draw a diagonal line across the part of this section that remains blank after the employee has completed her/his comments). By recording her/his comments in this section, the employee does not necessarily indicate that she/he agrees with this appraisal, and she/he does not become obligated to any action program indicated above. It is not necessary for the employee to sign this form. The employee may review this form upon request to her/his manager, during the six months following the interview.

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MANAGER'S SUMMARY OF THE INTERVIEW

This section is prepared by the manager in the presence of the employee at the close of the interview. It is a summary of what the manager regards as the most important aspects of the interview. This section should also include any action programs agreed upon by the manager and employee for improving the employee's performance or capabilities. In addition, this section should include a list of approximately three to five specific performance objectives which the manager and the employee jointly select as the most important job objectives to be attained by the employee during the coming appraisal period. These objectives should be stated as specifically as possible, and preferable in quantitative terms.

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APPENDIX 3

THE BEHAVIOURALLY ANCHORED RATING SCALES PA FORMAT

DATACOM STANDARD PERFORMANCE APPRAISAL

NAME:

DATE OF LAST APPRAISAL:

DATE OF THIS APPRAISAL:

When using the following forms it is the task of the rater to place each ratee at an appropriate point on each scale, for all relevant job dimensions. To do this the rater must determine what behaviours are most frequently displayed by a ratee and then tick the point on the scale that corresponds to examples ('anchors') of those behaviours. Occasionally a ratee will display behaviours which are provided in anchors at points either higher or lower on the scale, and for this reason it must be stressed that it is the behaviours which a ratee displays most of the time that determine at what point a ratee is to be placed. (In such cases, raters may wish to mark these behaviours for discussion during the interview).

By providing examples of behaviours at all points on the scale, this type of performance appraisal assists ratees to improve their performance by identifying behaviours which they should either aim towards, or avoid displaying, as appropriate.

There are spaces at the bottom of each job dimension and a separate page at the back where raters should record any specific comments.

JOB DIMENSION: PLANNING, ORGANISING & ADMINISTRATION

7. ☐ EXCELLENT	Continually revises plans for changing requirements. Tackles long and difficult jobs in small steps with clearly defined goals. At all times uses a "to do" list and sets priorities.
6. ☐ VERY GOOD	Records time at every change of activity and is careful in choice of timesheet codes and descriptions. Regularly updates priorities and deadlines in "to do" list. Plans for system to be in a stable state, and documents changes, prior to going on holiday.
5. ☐ GOOD	Knows what is happening now, and what should be happening next. Seldom overruns deadlines or time limits for projects. Timesheets input on-time, and reflect time spent on work.
4. ☐ ADEQUATE	Plans sometimes slip out of date. Works from a "to do" list but without reassigning priorities as new work comes in.
3. ☐ BELOW AVERAGE	Puts off jobs that are not attractive and does easy jobs first. Abandons "to do" list at times of high activity and urgency.
2. ☐ VERY POOR	Does not delegate work, but attempts to do it all. Accepts more work from client when time constraints are already critical. Doesn't assign priorities or reassign priorities as new work comes in. Records time whenever thinks of it, but has lapses from time to time which require "cooking" of figures.
1. ☐ UNACCEPTABLE	Over-runs deadlines and time limits frequently. Timesheets are lost, input late, or often need querying. Often caught with too much work to be able to meet due date, as a result of poor planning. Allows duplicate sources to exist. Fails to keep to any plans given.

JOB DIMENSION: FAULT DIAGNOSIS & CORRECTION

7. ☐ EXCELLENT	Checks own diagnosis of a problem from every possible angle before accepting that it is the correct one. Even under pressure, obtains necessary facts quickly and rectifies problem. Finds the simplest and most appropriate method of correction and ensures problem does not recur.
6. ☐ VERY GOOD	Ensures that the fix for a fault is consistent with the system and doesn't create new problems. When system problems occur, can quickly pinpoint areas affected and correct problem. Leaves audit trail of adjustments made to client data files.
5. ☐ GOOD	Documents inside programs when changes made to correct faults. Maintains and refers to crash log so that when problems recur they can be fixed quickly and efficiently.
4. ☐ ADEQUATE	Can usually recognise faults quickly, but needs to pay more attention to solutions as sometimes chooses an inappropriate solution. Keeps crash log spasmodically.
3. ☐ BELOW AVERAGE	Follows obvious leads and finds most faults, but doesn't follow difficult or subtle faults through to a conclusion. Spends unwarranted time on minor problems.
2. ☐ VERY POOR	Can rarely find the cause of a problem. Fixes the obvious problem without looking further. Tends to fix faults by patching things up.
1. ☐ UNACCEPTABLE	Often delays fault fixing until critical. Attempts at correction often make the problem worse or affect another area of the system.

JOB DIMENSION:	DOCUMENTATION
7. ☐ EXCELLENT	Writes just enough documentation about his/her systems so that someone can comfortably take over when he/she is away.
6. ☐ VERY GOOD	Organises and indexes the documentation so that points of interest can be found by others. Documents program amendments with dated comments. Updates the documentation to describe what has actually been programmed for, rather than what was originally intended.
5. ☐ GOOD	Keeps a copy of external documentation where appropriate. Program listings are filed with name dividers and can be relied on to be up to date. Where relevant writes notes for benefit of future "first contacts" on how to handle situations that may occur in the future.
4. ☐ ADEQUATE	Tends to document well in certain areas only. Documents basic information, eg. type of system; user logicals; and accounts in use.
3. ☐ BELOW AVERAGE	Documents when a project is being developed but as changes occur lets it get out of date.
2. ☐ VERY POOR	Does not update the system description when making major software amendments. Spends time creating unnecessary documentation.
1. ☐ UNACCEPTABLE	Must be hounded to produce documentation. Fails to keep program listings up to date and does not index them for ease of use. Has no documentation suitable for handing onto someone when he/she is absent.

JOB DIMENSION: CODING

7. ☐ EXCELLENT	Inconsistencies in specifications are always discussed with project leader and resolved. Designs structure prior to coding. Produces accurate code efficiently and quickly. Builds debugging facilities into initial version of a program rather than expecting it to run correctly first time. Reviews code a few days after it was written and alters parts which are not immediately clear.
6. ☐ VERY GOOD	Thinks out clearly what the program should do and not do, before starting to enter the code. Checks that all parts of program are conforming to specification. Comments all difficult code clearly and concisely. Writes programs so that local changes will only have local consequences.
5 ☐ GOOD	Uses approved skeletons and functions. Writes comments at time of coding.
4. ☐ ADEQUATE	Uses Datacom standards in program format. Writes programs that produce meaningful error messages rather than "blow up".
3. ☐ BELOW AVERAGE	Uses subroutines excessively so that control is passed all over the program and therefore is hard to follow. Makes excessive use of "flags".
2. ☐ VERY POOR	Programs strictly to the specs, even when not understanding the logic behind it. Writes clever code at the expense of ease of understanding. Produces code that is difficult to amend.
1. ☐ UNACCEPTABLE	Programs are rats' nests, lacking structure. Writes very few comments, or writes meaningless comments which state the obvious.

JOB DIMENSION: CLIENT CONTACT

7. ☐ EXCELLENT	Gets in touch with client promptly in response to problems and gives client confidence that someone cares about his/her problem. Gives clients realistic estimates and undertakings, even when this is likely to cause conflict.
6. ☐ VERY GOOD	Diverts the client from unimportant problems quickly, without giving offence. Processes client requests quickly and efficiently. Keeps client up to date on current situation.
5. ☐ GOOD	Is helpful and friendly. Does not hesitate to contact client when necessary. Returns client calls promptly.
4. ☐ ADEQUATE	Shy and not forthcoming with questions to clients. Occasionally fails to return client calls.
3. ☐ BELOW AVERAGE	Doesn't distinguish between important and unimportant client requests. Allows the client to spend too much time discussing trivia.
2. ☐ VERY POOR	Doesn't keep client up to date with current situation of system. Tends to take their side excessively and give work away. Writes notes from client phone calls on scraps of paper and forgets to meet client's request, or information conveyed.
1. ☐ UNACCEPTABLE	Doesn't use appropriate written or spoken language when communicating with client, resulting in client feeling uncomfortable. Is rude and unfriendly.

JOB DIMENSION: TESTING

7. ☐	EXCELLENT	Designs co-ordinated test to cover the whole system. Thoroughly plans tests, with expected results, and carries them out systematically. Sets up test data to cover all possibilities, not just the obvious ones. Writes explanatory notes about test data so that saved test files can be used in the future.
6. ☐	VERY GOOD	Tests both the expected and the more unlikely inputs. Saves test data for future use. Plans, enters, and backs up test data at the start of a system's development.
5. ☐	GOOD	Verifies ouput of a program against expected results.
4. ☐	ADEQUATE	Sets up test data and tests likely inputs.
3. ☐	BELOW AVERAGE	Assumes test data correct instead of thorough checking. Prepares test data without ensuring that it reflects all possible situations. When system testing, does so in a piecemeal fashion.
2. ☐	VERY POOR	Fails to check original specification before testing. Once system is implemented does not bother maintaining test files. Doesn't prepare a test plan or list expected outputs.
1. ☐	UNACCEPTABLE	Satisfied once the program runs without crashing and does not bother with further testing. When amending programs for situations that are hard to test, just hopes for the best and uses it live. Takes unnecessary risks by failing to test his/her solution on test data or by not backing up files sufficiently before attempting solution. Consistently allows major system and programming errors to be implemented into a live system.

JOB DIMENSION: COMMUNICATION - INTERNAL

7. ☐ EXCELLENT

Keeps supervisor up to date with state of work and potential problems.
Always willing to assist others, and ensures that it doesn't affect own work.

6. ☐ VERY GOOD

Asks for help from the appropriate person in time, but not before he/she has made a good attempt him/herself.
Passes on hints and new techniques to others by clearly documenting it and sending a note around.

5. ☐ GOOD

Informs supervisor if overruns on project are likely.
Initiates and gets others involved in staff activities.
Keeps other staff members aware of interesting aspects of work.

4. ☐ ADEQUATE

Participates and co-operates, but doesn't initiate communication.
Is available to others for suggestions and help, but gets carried away and spends too much time doing too much.

3. ☐ BELOW AVERAGE

Fails to inform supervisor when running out of work, or becoming swamped with work.

2. ☐ VERY POOR

Battles on with a problem, obtaining ever-diminishing returns, without seeking help.
Disturbs others through constant grumbling and negative outlook.
Fails to keep supervisor informed of potential problems until they become crises.

1. ☐ UNACCEPTABLE

Discourages other staff members from asking for help.
When asked for help, uses it as a chance for a put-down.
Fails to make supervisor aware of crises.

JOB DIMENSION: SYSTEMS DESIGN

7. ☐ EXCELLENT	Makes considerable effort to find out and appreciate how the user utilises the system. Designs for flexibility and amendability, recognising that all systems are changed while they are used. Looks for implications of user requirements and their likely impact on other parts of the system. Gives creative consideration to possible future trends and needs.
6. ☐ VERY GOOD	Considers recovery from power failures or program failures when designing systems. Designs systems for easy programming and maintenance.
5. ☐ GOOD	Ensures that critical areas are restartable. Meets clients requirements for design and leaves options for amendments and enhancements.
4. ☐ ADEQUATE	Designs systems which work, but without considering their efficiency. Design usually meets client requirements.
3. ☐ BELOW AVERAGE	Hardwires things which, given a little more forethought, could have been left flexible. Fails to keep systems simple. Fails to take into account client's possible future needs. Doesn't look for ways of co-ordinating different functions and requirements to streamline the system.
2. ☐ VERY POOR	Takes client at his/her word when he/she says something won't change, even when it seems likely that it might. Tends to" reinvent the wheel".
1. ☐ UNACCEPTABLE	Fails to consider recovery from program failure when designing systems. Fails to consider the impact that a change to one part will have on another. Design seldom meets requirements of systems report or RFP.

JOB DIMENSION: DEVELOPING AND UNDERSTANDING OF SYSTEMS

7. ☐ EXCELLENT

Retains for future use a clearly set out record of any important details he/she has discovered in an investigation.
Develops an understanding of what a system is intended to to do without getting immersed in the detail.

6. ☐ VERY GOOD

Follows data throughout a system to develop understanding of the flow.
Knows what documentation and other resources are available and where to find them.

5. ☐ GOOD

Actively asks pertinent questions about the system from appropriate persons.

4. ☐ ADEQUATE

Learns how parts of a system affect each other.
Finds out where software menus and live and test data files reside.

3. ☐ BELOW AVERAGE

Picks up knowledge which is actively passed on about a system, but does not seek it out himself/herself.
Does not record information learnt about a system so that it can be used by him/herself or others.

2. ☐ VERY POOR

Visualises the system as a collection of separate parts, not as a complete system.
Doesn't consider the interrelationship of parts of a system.
Becomes immersed in the detail of the components of the system and loses sight of it's overall function and objectives.
Only takes interest in small areas.

1. ☐ UNACCEPTABLE

Doesn't read system reports and documentation.
Doesn't seek out basic information about a system, even when required to do so.

JOB DIMENSION: PROGRESSIVENESS

7. ☐ EXCELLENT	Is constantly alert to the possibilities of doing things in better ways. Seeks out new facilities or creates them if not available.
6. ☐ VERY GOOD	Learns about and takes care to avoid known errors and new errors in current software tools. Actively learns about new facilities. Seeks out opportunities to try new methods or technology.
5. ☐ GOOD	Slightly hesitant to try out new techniques, but once confident, uses them regularly. Sees need for a new methd and attempts to do something about it.
4. ☐ ADEQUATE	Learns about, and uses new facilitities if required to do so.
3. ☐ BELOW AVERAGE	Not fully familiar with new developments. Content to use available facilities, but will use new methods if suggested. Sees the need for a new method but does not take responsibility for devising it. Uses only tried and true methods, does not use new features available. Experiments with new facilities at expense of current work.
2. ☐ VERY POOR	Not willing to try out new techniques.
1. ☐ UNACCEPTABLE	Shows no interest in new developments. Totally oblivious of modern developments.

RATER'S COMMENTS

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Signatures

Rater .....

Date .....

Systems Manager .....

Date .....

MANAGERS' COMMENTS AND SUMMARY OF THE INTERVIEW

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Signature

Manager .....

Date .....

APPENDIX 4

SUMMARY STATISTICS FROM THE JDS

JDS MEANS AND STANDARD DEVIATIONS FOR CHRISTCHURCH

	June 1984		Feb. 1985	
	$\bar{X}$	S.D.	$\bar{X}$	S.D.
Skill variety	5.79	1.00	6.18	0.63
Task identity	5.23	1.46	5.45	1.16
Task significance	5.27	1.30	5.82	1.03
Autonomy	5.50	1.37	5.39	1.43
Feedback from job	5.54	1.08	5.15	1.23
Feedback from agents	4.51	1.10	5.23	1.06
Dealing with others	6.13	0.86	6.12	1.34
Experienced meaningfulness	5.44	1.13	5.75	1.03
Experienced responsibility	5.97	0.87	5.88	1.05
Knowledge of results	5.00	1.37	5.39	1.19
General satisfaction	4.81	1.21	5.24	1.30
Internal motivation	5.93	0.98	6.00	0.72
Pay satisfaction	3.90	1.83	5.31	0.97
Security satisfaction	4.94	1.56	5.86	1.32
Social Satisfaction	5.72	0.92	5.41	1.02
Supervisory satisfaction	5.13	1.46	5.47	1.44
Growth satisfaction	5.41	0.96	5.55	1.08
N	16		12	

Appendix 4 (Continued)

JDS MEANS AND STANDARD DEVIATIONS FOR AUCKLAND

	June 1984		Feb. 1985	
	$\bar{X}$	S.D.	$\bar{X}$	S.D.
Skill variety	5.29	1.00	5.00	1.36
Task identity	5.04	1.66	5.26	1.35
Task significance	5.06	1.33	4.78	1.23
Autonomy	5.08	1.38	5.48	1.23
Feedback from job	5.60	1.25	6.04	0.64
Feedback from agents	4.51	1.28	4.30	1.26
Dealing with others	5.63	1.48	5.11	1.42
Experienced meaningfulness	5.36	1.14	5.11	0.87
Experienced responsibility	5.67	1.11	5.67	0.98
Knowledge of results	5.28	1.24	5.64	0.92
General satisfaction	4.61	0.97	4.47	0.86
Internal motivation	5.87	0.78	5.81	1.14
Pay satisfaction	3.68	1.49	5.42	1.32
Security satisfaction	5.23	1.21	6.13	1.07
Social satisfaction	5.01	1.03	4.97	0.94
Supervisory satisfaction	5.81	1.15	5.14	1.17
Growth satisfaction	5.36	1.22	5.17	0.92
N	16		12	

Appendix 4 (Continued)

JDS MEANS AND STANDARD DEVIATIONS FOR HAMILTON

	June 1984		Feb. 1985	
	$\bar{X}$	S.D.	$\bar{X}$	S.D.
Skill variety	5.25	1.50	5.44	1.34
Task identity	5.47	0.96	5.67	1.09
Task significance	4.89	1.51	5.63	0.87
Autonomy	5.33	0.91	5.44	1.10
Feedback from job	5.03	1.21	5.59	1.16
Feedback from agents	3.80	1.10	4.31	1.06
Dealing with others	5.17	1.67	5.81	0.72
Experienced meaningfulness	5.67	1.00	5.50	1.01
Experienced responsibility	5.79	1.07	5.72	1.16
Knowledge of results	5.10	1.28	5.47	1.14
General satisfaction	4.73	1.17	4.80	1.19
Internal motivation	5.46	1.22	6.09	0.75
Pay satisfaction	4.74	1.36	4.49	1.29
Security satisfaction	5.45	0.97	5.58	1.03
Social satisfaction	5.12	1.06	5.60	1.11
Supervisory satisfaction	4.83	1.12	5.39	1.02
Growth satisfaction	5.17	1.33	5.16	1.19
N	12		9	

Appendix 4 (Continued)

JDS MEANS AND STANDARD DEVIATIONS FOR WELLINGTON

	June 1984		Feb. 1985	
	$\bar{X}$	S.D.	$\bar{X}$	S.D.
Skill variety	6.07	0.94	6.00	1.05
Task identity	4.47	1.32	4.44	1.77
Task significance	5.15	1.18	5.67	1.05
Autonomy	5.22	1.31	5.61	0.83
Feedback from job	5.30	0.97	4.89	1.20
Feedback from agents	4.04	1.21	4.24	1.34
Dealing with others	5.89	0.87	6.11	0.66
Experienced meaningfulness	5.33	1.18	5.83	0.80
Experienced responsibility	5.70	1.10	5.75	0.72
Knowledge of results	4.81	1.29	5.00	1.19
General satisfaction	4.43	1.05	4.17	1.21
Internal motivation	5.94	0.76	6.00	0.78
Pay satisfaction	3.92	1.31	5.61	0.55
Security satisfaction	4.86	1.04	5.24	0.88
Social satisfaction	5.43	0.96	5.70	0.57
Supervisory satisfaction	4.67	1.12	5.51	0.74
Growth satisfaction	5.31	1.05	4.83	1.49
N	9		6	

APPENDIX 5

THE USER SATISFACTION QUESTIONNAIRE

C O N F I D E N T I A L Q U E S T I O N N A I R E

INSTRUCTIONS

Four of the main services which Datacom Systems offer are:

(1) Compay/Computa-pay (Payroll)
(2) Timeshare
(3) Datacom standard package software
(4) Datacom tailor-made software

The first FOUR sections of this questionnaire deal with these four services. From these, please answer only the section/s which deal with the service/s which have been, or are, of significant importance to you, and then go on to answer Sections 5, 6 & 7.

Please indicate how satisfied you are with each of the following aspects of Datacom's service. Write the appropriate number from the scale below, in the space to the left of each statement.

1	2	3	4	5	6	7	8
Extremely Dissatisfied	Dissatisfied	Slightly Dissatisfied	Neutral	Slightly Satisfied	Satisfied	Extremely Satisfied	Not Applicable

A sample statement is given below:

[7] A.1 The name change from CBL to Datacom Systems

The number 7 indicates that the respondent is extremely satisfied with the name change to Datacom Systems

Individual comments are very useful, and therefore we would appreciate any comments which you may wish to make. For this purpose a space has been left under each statement where you can write comments if you should wish to do so.

1	2	3	4	5	6	7	8
Extremely Dissatisfied	Dissatisfied	Slightly Dissatisfied	Neutral	Slightly Satisfied	Satisfied	Extremely Satisfied	Not Applicable

1. **This section deals with COMPAY/Computa-Pay**

☐ 1.1 Meets your needs
Comments

☐ 1.2 Reliability of service
Comments

☐ 1.3 Cost effectiveness
Comments

☐ 1.4 Suitability of reporting formats
Comments

☐ 1.5 Ease of use
Comments

☐ 1.6 Quality and content of User Manual
Comments

☐ 1.7 Quality and content of training course/s
Comments

☐ 1.8 Turnaround/performance
Comments

☐ 1.9 Quality of data preparation service
Comments

☐ 1.10 Assistance during implementation
Comments

1.11 Which payroll service do you use? Tick the appropriate box.

☐ Compay; or

☐ Computa-pay

Now go on to Sections 2, 3 & 4, where applicable.
Then go on to sections 5, 6 & 7.

1	2	3	4	5	6	7	8
Extremely Dissatisfied	Dissatisfied	Slightly Dissatisfied	Neutral	Slightly Satisfied	Satisfied	Extremely Satisfied	Not Applicable

2. **This section deals with the DATACOM Timeshare service.**

☐ 2.1 Meets your needs
Comments

☐ 2.2 Cost effectiveness
Comments

☐ 2.3 Availability of machine resource
Comments

☐ 2.4 Reliability of service
Comments

☐ 2.5 Response time/performance
Comments

☐ 2.6 Security of data
Comments

☐ 2.7 Assistance during implementation
Comments

Now go on to Section 3 &/or 4, if applicable,
otherwise go on to sections 5, 6 & 7.

1	2	3	4	5	6	7	8
Extremely Dissatisfied	Dissatisfied	Slightly Dissatisfied	Neutral	Slightly Satisfied	Satisfied	Extremely Satisfied	Not Applicable

3. **This section deals with Datacom's standard package software (other than Compay/Computa-pay mentioned above) and which is available either on Datacom Timeshare or batch bureau or on your own Datacom supplied computer.**

☐ 3.1 Meets your needs
Comments

☐ 3.2 Cost of software
Comments

☐ 3.3 Reliability of software
Comments

☐ 3.4 Ease of use
Comments

☐ 3.5 Quality and content of User Manual
Comments

☐ 3.6 Quality and content of training course/s
Comments

☐ 3.7 Assistance during implementation
Comments

Now go on to section 4, if applicable,
otherwise go on to sections 5, 6 & 7.

1	2	3	4	5	6	7	8
Extremely Dissatisfied	Dissatisfied	Slightly Dissatisfied	Neutral	Slightly Satisfied	Satisfied	Extremely Satisfied	Not Applicable

4. **This section deals with DATACOM developed software which is tailor-made for your organisation and is provided either on Timeshare or on your own Datacom supplied computer.**

☐ 4.1 Datacom's ability to understand your needs
Comments

☐ 4.2 Cost of software development
Comments

☐ 4.3 Reliability of software
Comments

☐ 4.4 Performance of software
Comments

☐ 4.5 Ease of use
Comments

☐ 4.6 Datacom's ability to meet your development timetable
Comments

☐ 4.7 Quality and content of the training course/s

☐ 4.8 Assistance during implementation
Comments

☐ 4.9 Quality and content of documentation

1	2	3	4	5	6	7	8
Extremely Dissatisfied	Dissatisfied	Slightly Dissatisfied	Neutral	Slightly Satisfied	Satisfied	Extremely Satisfied	Not Applicable

Now complete the following sections

5. **This section deals with Datacom's service and staff, in general**

☐ 5.1 Datacom staff's understanding of the nature of your business
Comments

☐ 5.2 Availability of staff when you want them
Comments

☐ 5.3 Responsiveness of staff to unusual requirements
Comments

☐ 5.4 Speed with which staff rectify problems
Comments

☐ 5.5 Communication skills of staff
Comments

☐ 5.6 The general attitude and manner of Datacom staff
Comments

☐ 5.7 Frequency of follow-up contact by Marketing staff
Comments

☐ 5.8 Effectiveness of follow-up support by Marketing staff
Comments

Please note any other comments here

6. DATACOM SYSTEMS IN GENERAL

A summary of your impressions of Datacom Systems.

Please circle the number in each scale which you feel is appropriate.

Old Fashioned						Progressive
1	2	3	4	5	6	7
Low Profile						High Profile
1	2	3	4	5	6	7
Poor Service						Good Service
1	2	3	4	5	6	7
Short Term Solution						Long Term Solution
1	2	3	4	5	6	7
Poor Quality Products						High Quality Products
1	2	3	4	5	6	7
Low Ethics						High Ethics
1	2	3	4	5	6	7
Poor Management						Good Management
1	2	3	4	5	6	7
Declining Company						Growth Company
1	2	3	4	5	6	7
Impersonal						Friendly
1	2	3	4	5	6	7

7.1 What industry sector are you in? Tick appropriate box.

- ☐ Manufacturing
- ☐ Legal
- ☐ Accountancy
- ☐ Wholesale distribution
- ☐ Retail
- ☐ Construction
- ☐ Transport
- ☐ Finance
- ☐ Engineering
- ☐ Insurance
- ☐ Service
- ☐ Local government
- ☐ Other - specify .....

7.2 What is your approximate average monthly expenditure with Datacom Systems? Tick appropriate box.

- ☐ Less than $100
- ☐ $100 - $500
- ☐ $501 - $3,000
- ☐ $3,001 - $10,000
- ☐ More than $10,000
- ☐ Not known

7.3 What is the approximate number of staff in your organisation? Tick appropriate box.

- ☐ Less than 20
- ☐ 20 - 50
- ☐ 51 - 200
- ☐ 201 - 1,000
- ☐ More than 1,000

PLEASE NOTE: If you wish to preserve your anonymity, it is not necessary to fill in the information requested below.

Company : .....

Name : .....

Position : .....

As only limited information can be obtained from a questionnaire such as this, a sample of Users will be interviewed to provide a more detailed picture of Users' satisfaction with Datacom's services.

If you are willing to be interviewed please tick this box ☐

Thank you for taking the time to complete this questionnaire.

APPENDIX 6

THE FACTOR PATTERN MATRICES

FACTOR PATTERN MATRIX: PAYROLL & STAFF ANALYSIS

	Question	VARIMAX ROTATED FACTORS[1] I	II	III	Commu-nality
1.1	Meets user's needs	1662	7366	0955	5793
1.2	Reliability of payroll service	3852	5690	0029	4721
1.3	Cost effectiveness	1373	4567	0805	2340
1.4	Suitability of reporting formats	0600	6656	1500	4692
1.5	Ease of use	1439	6981	1151	5214
1.6	Quality/Content of User Manual	1688	4274	0870	2187
1.7	Quality/Content of Training Courses	2252	3776	2625	2623
1.8	Turnaround/Performance	2344	5500	0188	3578
1.9	Quality of data prep service	3528	4530	0795	3360
1.10	Assistance during implementation	4427	4480	1583	4218
5.1	Understanding of user's business	5494	3688	2767	5145
5.2	Availability of staff	5995	1414	3031	4713
5.3	Responsiveness to unusual requirements	7899	2364	2090	7235
5.4	Speed of problem rectification	7581	2812	0970	6633
5.5	Communication skills of staff	7038	2491	1825	5908
5.6	Attitude and manner of staff	7047	1764	2164	5746
5.7	Frequency of Mkt.Dept. contact	2870	1344	8534	8288
5.8	Effectiveness of Mkt.Dept.support	3489	1813	8674	9071
	Eigenvalues	7.144	1.957	1.218	
	% Variance	39.7	10.9	6.8	

1. Decimal points omitted and loadings >.4 underlined.

FACTOR PATTERN MATRIX: TIMESHARE & STAFF ANALYSIS

	Question	VARIMAX ROTATED FACTORS[1] I	II	III	Communality
2.1	Meets user's needs	1670	6141	3020	4963
2,2	Cost effectiveness	1887	5253	3398	4270
2.3	Availability of machine resource	2156	8221	0963	7316
2.4	Reliability of service	3443	6275	0557	5155
2.5	Response time/Performance	2324	6437	1958	5068
2.6	Security of data	2706	0970	0168	0829
2.7	Assistance during implementation	4554	4288	0719	3965
5.1	Understanding of user's business	6539	3905	1885	6156
5.2	Availability of staff	6524	2312	2636	5487
5.3	Responsiveness to unusual requirements	7131	2034	2453	6101
5.4	Speed of problem rectification	8007	2126	0925	6950
5.5	Communication skills of staff	7141	3214	0185	6136
5.6	Attitude and manner of staff	5835	0679	2468	4061
5.7	Frequency of Mkt.Dept. contact	2314	2099	8703	8550
5.8	Effectiveness of Mkt.Dept.support	1798	1838	9448	9588
	Eigenvalues	6.390	1.617	1.490	
	% Variance	42.6	10.8	9.9	

1. Decimal points omitted and loadings >.4 underlined

FACTOR PATTERN MATRIX: PACKAGE & STAFF ANALYSIS

	Question	VARIMAX ROTATED FACTORS[1] I	II	III	Commu-nality
3.1	Meets user's needs	0252	7327	2446	5973
3.2	Cost effectiveness	1216	4205	0824	1984
3.3	Reliability of software	3475	4770	-0046	3484
3.4	Ease of use	1679	5699	1221	3679
3.5	Quality/Content of user manual	4101	4838	-1391	4216
3.6	Quality/Content of training courses	6023	3949	1487	5409
3.7	Assistance during implementation	4512	3935	3598	4879
5.1	Understanding of user's business	6343	3697	2463	5997
5.2	Availability of staff	7054	0069	2623	5664
5.3	Responsiveness to unusual requirements	7304	0743	2872	6215
5.4	Speed of problem rectification	7659	2734	0748	6670
5.5	Communication skills of staff	6648	3139	1359	5590
5.6	Attitude and manner of staff	4910	2343	2452	3562
5.7	Frequency of Mkt.Dept. contact	2675	1388	8935	8892
5.8	Effectiveness of Mkt.Dept. support	2794	1783	8978	9161
	Eigenvalues	6.290	1.620	1.390	
	% Variance	41.9	10.8	9.3	

1. Decimal points omitted and loadings >.4 underlined

FACTOR PATTERN MATRIX: DEVELOPED & STAFF ANALYSIS

	Question	VARIMAX ROTATED FACTORS[1] I	II	III	Commu-nality
4.1	Understanding of user's needs	3592	4783	1250	3735
4.2	Cost of software development	2766	6203	1987	5009
4.3	Reliability of software	4747	6244	0402	6169
4.4	Performance of software	5555	4859	1055	5558
4.5	Ease of use	3642	5885	2139	5247
4.6	Meets user's development timetable	3378	5392	2726	4792
4.7	Quality/Content of training courses	-0363	5010	3655	3859
4.8	Assistance during implementation	0900	6013	2856	4514
4.9	Quality/Content of documentation	2744	4498	3840	4250
5.1	Understanding of user's business	7173	2014	2148	6012
5.2	Availability of staff	6011	3012	1946	4900
5.3	Responsiveness to unusual requirements	6485	3037	1452	5339
5.4	Speed of problem rectification	8753	0927	0848	7821
5.5	Communication skills of staff	7299	3054	-0051	6261
5.6	Attitude and manner of staff	5252	2153	1943	3600
5.7	Frequency of Mkt.Dept. contact	2000	1837	8772	8434
5.8	Effectiveness of Mkt.Dept. support	2417	1948	9160	9355
	Eigenvalues	7.589	2.061	1.191	
	% Variance	44.6	12.1	7.0	

1. Decimal points omitted and loadings >.4 underlined